THE PROGRESSIVE ARITHMETIC

W. F. NICHOLS

PART TWO

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THE

PROGRESSIVE ARITHMETIC

PART II

BY

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PREFACE.

THIS is the second of a series of three books.

The topics presented in the first book are reviewed and extended to problems of greater difficulty. This increase in difficulty, however, is gradual, as each problem has been carefully selected with reference to what has preceded, and to what is to follow.

The elementary principles of common fractions, decimal fractions, and percentage are developed and illustrated in this book, but the more difficult phases of those subjects are reserved for the next book.

The simpler geometric forms are introduced and so illustrated that clear conceptions are formed, and the principles thus developed are then applied in many practical problems.

The classification and plan of presentation is the same as that of Part I, including statements which require original and independent thinking on the part of the pupils, and including also the miscellaneous lessons which give constant review and are far more beneficial to the pupils than examples all classified and labeled.

While this book contains much new matter, the author has drawn largely from his "Graded Lessons in Arithmetic," a series which has been so favorably received, consisting of a separate book for each school year.

The author wishes here to express his indebtedness to the many teachers, supervisors, and superintendents, who have tested the problems, criticised the work, and given many helpful suggestions.

W. F. NICHOLS.

NEW HAVEN, March 1, 1903.

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PART TWO.

MISCELLANEOUS REVIEW.

Note. — In simplifying expressions that are connected by the signs plus and minus, perform the operations in the order in which the signs occur ; or add all the quantities having a plus sign, then all quantities having a minus sign, and find the difference of these sums.

1. Simplify: $486 - 194 + 245 - 89 + 587 - 283 + 785$.
2. Simplify: $469 + 276 - 384 - 174 + 791 - 463 + 274$.
3. Simplify: $563 - 284 + 569 - 478 + 632 - 518 + 494$.
4. Simplify: $194 + 118 + 963 - 76 - 264 - 718 + 511$.
5. Simplify: $216 - 98 + 426 + 431 - 215 - 196 + 210$.
6. Find the cost of 434 sheep at $6 a head.
7. A farmer raised 634 bushels of potatoes, and sold 378 bushels. How many bushels had he left?
8. Add: 268, 723, 432, 785, 47, 496, 9, 780, 21, 947, 435.
9. A has 264 sheep, and B has 7 times as many. How many sheep have both?
10. If a farmer received $279 for 6 cows, what was the average price a cow?
11. If a man divides some money among his 6 children, giving each one $436, how much money does he divide?
12. How much must a grocer pay for 754 chests of tea at $8 a chest?
13. How many marbles have 7 boys, if each boy has 95 marbles?

1

Addition is the process of finding the sum of two or more numbers of the same kind.

The result of an example in addition is called the sum.

Add:

1.	2.	3.	4.
8277	7281	6987	9752
6949	4969	6668	7831
9788	8799	7875	5527
9686	8698	8997	9886
6798	9769	4885	7734
5848	4858	9796	9958
7984	8979	8689	9475
5878	7857	8799	6279

5.	6.	7.	8.
6677	5966	7238	4922
1196	2787	4497	7857
6336	6896	9864	9637
9474	8567	8937	4762
4893	5674	4774	5446
8986	8963	3683	6697
8449	7878	9489	6857
7723	9667	8119	9434

9.	10.	11.	12.
7533	5644	2674	8758
6387	2674	6445	3357
4491	7473	7966	9185
8746	4758	5863	4613
9384	8229	4349	8496
8434	2294	3849	3492
7586	7587	7461	8631
3796	4736	4918	9669

1. Give all the odd numbers from 1 to 25.

2. Give all the even numbers from 2 to 24.

3. Give 5 numbers that are divisible (can be exactly divided) by 3.

4. Give 5 numbers that are divisible by 4.

5. Give 5 numbers that are *not* divisible by 3.

6. Give 5 numbers that are *not* divisible by 4.

7. How many quarts of vinegar at 5¢ a pint can be bought for $1?

8. George paid 45 cents for marbles. If he received 9 marbles for every 5 cents, how many marbles did he receive?

9. If you buy a dozen oranges at 60¢ a dozen, how much does each cost?

10. If ½ pound of yarn costs 50 cents, how much will 2½ pounds cost?

11. If your brother works ¾ of a day one week, and three half days the next week, how many days does he work during the 2 weeks?

12. How much money should you receive for 36 eggs at the rate of 25 cents a dozen?

13. Jennie had 36 cherries. She gave ⅓ of them to her little brother, ¼ of them to her little sister, and ate ⅓ of those she had left. How many did she keep?

14. A little boy who lives beside a brook catches all the musk-rats he can find. If he catches 4 every month, except the winter months, how many does he catch in a year?

15. How much will 3½ qt. of milk cost, if 1 pint is worth 3 cents?

16. What must I pay for 16 eggs at 12¢ a dozen?

17. 8 eggs are what part of a dozen? and what will they cost at 24¢ a dozen?

18. What will 2 doz. pears cost at 2¢ each?

19. How much must I add to 20 to make it 31?

Subtraction is the process of finding the difference between two numbers of the same kind.

The greater number is called the *minuend.*

The less number is called the *subtrahend.*

The result is called the *difference,* or *remainder.*

1.	2.	3.	4.	5.
4769	2387	4653	6431	6473
3574	1628	2819	2674	2748

6.	7.	8.	9.	10.
6743	4564	3782	5436	5692
4576	2684	2175	3265	2897

11.	12.	13.	14.	15.
4638	2897	3637	4648	7843
2784	1695	2846	3639	4567

16.	17.	18.	19.	20.
9741	8765	7654	6543	6785
7968	6574	4374	4638	4328

21.	22.	23.	24.	25.
7689	9876	8765	4321	5763
4785	7928	4386	3761	4854

26.	27.	28.	29.	30.
7060	4301	5640	7002	3674
6548	3619	4076	5609	2745

31.	32.	33.	34.	35.
4362	2794	4631	5148	3764
3689	1876	3574	4863	2675

1. The sum of two numbers is 364. One of the numbers is 178.

2. The minuend is 406 and the subtrahend is 295.

3. The minuend is 211 and the difference is 47.

4. The subtrahend is 109 and the remainder is 74.

5. A grocer sold 19½ lb. of butter at 26¢ a pound.

6. A farmer sold 24 tons of hay at $18½ a ton.

7. 24 bu. of potatoes were divided equally among 6 families.

8. A field is 60 rd. long and 40 rd. wide.

9. A boy having 39 apples kept 4 himself and divided the remainder equally among 7 boys.

10. 27 is one half of some number.

11. George lives 1 mile or 320 rd. from the school-house. He can walk 20 rd. a minute.

12. My mother bought a bushel of apples when 4 quarts cost 10 cents.

13. The rate of letter postage to any part of the United States is " two cents an ounce or fraction thereof." I mailed a letter that weighed 3 ounces.

14. In 1900 the population of Massachusetts was 2,805,346 and of Connecticut 908,355.

15. In 1890 the population of Maine was 694,466, and of Rhode Island 428,556.

16. I had $18. I paid a debt of $3 and divided the remainder equally among my 5 workmen.

17. A man bought a house for $2700 and another for $3200. He sold the first for $3150 and the second for $3450.

18. For 5 weeks a man earned $25.50 a week and spent $19.75.

19. A square has an area of 16 square inches.

1. If 44 cents are paid for 11 oranges, what is the cost of an orange?

2. If 1 lamp is worth $5, how many lamps of the same kind are worth $45?

3. A pint of cream costs me 15 cents. If I buy a pint a day, how much does my cream cost me for one week?

4. A box is 7 in. long and 5 in. wide. How long must a string be to reach round it?

5. How many quarts will fill a 2-gallon jug?

6. How many quart bottles can be filled from 24 pints of ink?

7. In 2 years there are —— months.

8. In 11 weeks there are —— school days.

9. A tailor bought 5 yd. of cloth for $16. What was the cost of a yard?

10. Complete:

$$\frac{2)}{8} \quad \frac{2)}{4} \quad \frac{3)}{6} \quad \frac{5)}{8} \quad \frac{7)}{5}$$

11. How many hours in ½ of a day? In ⅔ of a day?

12. I paid 56 cents for 7 lb. of raisins. What was the price a pound?

13. What is the cost of 8 lb. of oatmeal at 5¢ a pound?

14. If 1 man can do a piece of work in 35 days, in how many days can 5 men do the same work?

15. What is the cost of a cow, if ¼ of the price is $8?

16. If a cow is worth $32, and a calf ¼ as much, how much is the calf worth?

17. How many books are worth $36, if 1 book is worth $6?

18. If a boy earns $5 a week, in how many weeks can he earn $35?

19. Seven and what number equals 13?

20. Six is seven less than what number?

21. At $6 a ton, what will 9 tons of coal cost?

22. How many 9's are there in 27? In 45?

See Part 1, page 93.

Multiplication is a short way of adding equal numbers.

The *multiplicand* is one of the equal numbers to be added.

The *multiplier* is the number which shows how many equal numbers are to be added.

The *product* is the result of the multiplication.

1. Multiply 43 by 24.

```
  43
  24
 ‾‾‾
 172
 860
‾‾‾‾
1032
```

The multiplier consists of 20 and 4. We multiply by 4, and obtain the partial product 172. Then 20 times 3 units are 60 units, which equals 6 tens and 0 units. 20 times 4 tens are 80 tens, and 6 tens are 86 tens, which equals 6 tens and 8 hundreds. The two partial products added give 1032. After the work is thoroughly understood, omit the final cipher in the second partial product.

Multiply:

2.	43	39	23	76	68	47	87	38
	32	74	67	26	62	54	96	89

3.	58	46	36	58	83	64	73	32
	76	58	78	36	47	27	19	91

4.	73	94	74	85	28	82	75	89
	81	46	64	53	39	93	83	67

5.	32	76	54	71	34	56	67	64
	84	23	58	89	96	64	45	53

6.	36	42	27	62	25	52	87	74
	47	73	32	24	48	73	98	65

7.	52	36	42	26	63	37	73	75
	93	37	74	86	65	73	79	53

Multiply:

1. 53	24	78	64	67	75	53	39
74	85	52	26	69	95	68	88
2. 58	84	49	97	76	63	38	85
29	47	93	75	86	56	68	72
3. 123	345	567	789	987	532	478	646
42	25	56	63	34	45	62	58
4. 342	654	423	348	232	517	246	749
58	84	29	47	76	97	38	93
5. 908	542	726	536	729	618	637	563
59	94	45	56	67	78	86	82
6. 286	804	647	475	756	565	653	537
35	85	74	28	45	38	57	26
7. 375	692	245	209	507	908	592	307
88	56	94	21	84	68	44	87
8. 749	804	407	385	946	709	589	605
52	69	53	81	97	82	19	78
9. 553	367	481	708	930	895	585	753
32	45	82	69	35	92	83	56
10. 323	457	345	826	269	359	592	810
36	54	13	32	95	76	74	85
11. 188	293	347	378	587	849	964	567
96	48	84	93	37	85	35	67

1. A watch cost $20, and a chain cost $7. How much more did the watch cost than the chain?

2. Half a bushel of berries is how many quarts?

3. 2 bushels of potatoes are how many pecks?

4. A farmer has 24 acres of land. ⅛ is planted with potatoes, ⅙ with corn, 1/12 with oats, the rest to pasture land. How many acres each are there of potatoes, corn, oats, and pasture?

5. A man bought a horse for $85. He paid $10 in money, and gave his watch for the rest. How much was his watch worth?

6. 25 cents is what part of a dollar? · ¼ of a dollar is how many cents?

7. 21 is 14 more than what number?

8. 3 is what part of 36? 9 is what part of 36?

9. If $9 is ¼ of my money, how much money have I?

10. Grace spent 5 cents for a watch-key, and had 27 cents left. How much had she at first?

11. How many cents in two dollars and ninety-four cents?

12. How many dollars in six hundred forty-two cents?

13. If ¼ of a yard of ribbon costs 2 cents, how many yards can you buy for 32 cents?

14. How many yards is it round a rectangular rug 6 ft. long and 3 ft. wide?

15. George earns $6 a month selling papers, and John earns ⅓ as much. How much do both boys earn in a month? How much in 6 months?

16. Jennie had 11 quarts of nuts, and sold 8 pints. How many quarts had she left?

17. A grocer has 7 gal. 2 qt. of kerosene. How long will it last him if he sells a quart a day?

18. James has 9 cents; John 3 times as many less 6. How many has John?

1. Add: $6.84, $47.76, $96, $4.85, $46, $9.73, $75.

2. Multiply 4240 by 70.

3. Add: 6273, 7348, 4859, 5926, 8769, 3452, 8437.

4. At 8¢ a quart, what will 32 gal. of vinegar cost?

5. A farmer put his corn into 9 bins, putting 534 bu. into each bin. How many bushels of corn did he have?

6. Find the area of a piece of ground 219 yards long, and ⅓ as many yards wide.

7. Multiply 478 by 28.

8. Divide 4764 by 4.

9. At $6 an acre, how many acres of land can be bought for $3456?

10. Find the number of square inches in a piece of cloth, 6 ft. long, and 9 in wide.

11. I sold land for $4670, which was $575 less than I paid for it. What did it cost me?

12. A farmer raised 135 bu. of potatoes in each of 24 fields. How many bushels did he raise?

13. How many half-inch squares are there in a rectangular sheet of paper 10 in. wide and 8 in. long?

14. If 1 acre of land costs $9, how many acres can you buy for $6570?

15. What will 786 lb. of sugar cost at 6¢ a pound?

16. What number added to 2176 will give 5124?

17. Simplify: 596 + 378 + 216 − 432 − 674 + 963 − 459 − 76.

18. A man bought a house and lot for $3475, and sold it for $4350. How much did he gain?

19.	2764	2706	3896	4896	5643
	4	5	6	7	4

20.	6745	1974	5742	9808	1746
	18	19	23	32	36

1. Mr. Jackson paid $457.25 for a horse, $287.50 for a carriage, $56.75 for a harness, $12.35 for robes, and $1.75 for a whip. How much did he pay for all?

2. Below are a dealer's sales for a week. Find the value of the sales for each day, and also the value of each kind of merchandise for the week.

	MON.	TUES.	WED.	THURS.	FRI.	SAT.
Flour,	$175.25	$67.85	$246.29	$47.50	$116.11	$230.40
Sugar,	216.44	111.42	78.92	172.19	48.17	145.36
Tea,	98.17	6.45	15.45	8.39	9.11	75.45
Coffee,	79.71	11.46	9.78	12.15	16.45	26.32
Spices,	37.45	19.75	17.25	36.62	8.15	17.21
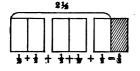
3. If your parlor is 18 feet long and 14 feet wide, and your sitting-room 16 ft. long and $12\frac{1}{2}$ ft. wide, how many feet of picture moulding do you need for both rooms?

4. I owe a grocer $75. If I begin Monday and pay him $5 every day during the week, how much shall I owe him Saturday night?

5. My coal cost me $52.75 last year, and $4.25 for carrying it into the cellar. This year my coal was $47.36, and $6.37 for carrying it in. How much more did my coal cost me last year than this?

6. A doctor owes a grocer $287.83, and the grocer owes the doctor $175.28. If the doctor should pay the grocer $28.36, how would their accounts then stand?

7. I bought 623 books at $7 each. How much did they cost?

8. A man bought 197 desks at $5 each. How much did they cost?

9. How many weeks are there in 3675 days?

10. Add: $4.05, $16.16, $11.07, $8.50, $9.60.

11. Add: $6.17, $30.07, $48.19, $94.05, $117.48.

12. Add: $8.97, $0.65, $17.41, $109.66, $75.19.
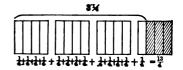
1. What will 5 bbl. of flour cost at $6 a barrel?

2. What part of 7 yards is 5 yards?

8. When coal is $6 a ton, what part of a ton will $3 buy?

4. If you can buy a gallon of vinegar for 15 cents, what part can you buy for 3 cents?

5. If you divide 16 peaches equally among 4 children, what part and how many will each receive?

6. When land is $20 an acre, what part of an acre can you buy for $5?

7. When peaches are selling at the rate of 5 for 8 cents, how many will 56 cents buy?

8. What number is that, which, if divided by 3 times 4, the quotient will be 8?

9. How many cows at $50 each can a man buy for $300?

10. How many 2-cent postage stamps can you obtain for 40 cents?

11. A boy had 20 marbles and lost ¼ of them. How many did he lose?

12. 12 times 6 are how many times 8?

13. After buying 7 balls, George had five cents left. If he had 40 cents at first, how much did he pay for the balls? How much for each ball?

14. A rectangle is 6 in. long, and contains 24 square inches. How wide is it?

15. A rectangle contains 32 square inches, and is 4 in. wide. How long is it?

16. What is the perimeter of a triangle, measuring 5 inches on each side?

17. Fill blanks:

½ yr. _____ mo.   ½ bu. _____ qt.   28 da. _____ wk.
8 qt. _____ pk.   3 yd. _____ ft.   16 pk. _____ bu.

18. A boy sold a knife for 75 cents, and gained 17 cents. How much did the knife cost him?
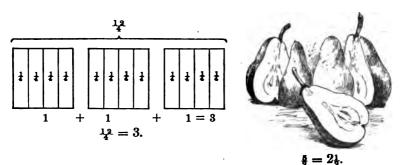
1. A mixed number is a whole number and a fraction united, as, $2\frac{1}{3}$, $4\frac{1}{6}$, etc.

2. Write 10 mixed numbers.

3. The following diagram illustrates the way to change mixed numbers to fractional forms.

a. How many halves are there in the first square below?

b. How many halves are there in the second square?

c. How many halves are there in the third?

d. Why do we cross off $\frac{1}{2}$ of the third square?

e. If each square represents a unit, how many units are represented below?

f. If there are two halves in each unit, how many halves are there in the 2 units?

g. How many halves are there then in $2\frac{1}{2}$?

h. In the other figure how many fourths are there in one square? In three squares? In $3\frac{1}{4}$ squares?

$2\frac{1}{2}$

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{5}{2}$

$3\frac{1}{4}$

$\frac{1}{4}\frac{1}{4}\frac{1}{4}\frac{1}{4} + \frac{1}{4}\frac{1}{4}\frac{1}{4}\frac{1}{4} + \frac{1}{4}\frac{1}{4}\frac{1}{4}\frac{1}{4} + \frac{1}{4} = \frac{13}{4}$

4. Change and illustrate as above:

   $2\frac{1}{3}$, $4\frac{1}{2}$, $5\frac{1}{3}$, $2\frac{1}{6}$, $2\frac{2}{3}$, $1\frac{1}{6}$, $2\frac{2}{4}$, $1\frac{7}{8}$, $2\frac{2}{8}$, $2\frac{2}{4}$.

5. Change and illustrate as above:

   $3\frac{4}{5}$, $2\frac{1}{8}$, $3\frac{2}{3}$, $4\frac{2}{10}$, $3\frac{1}{4}$, $2\frac{4}{8}$, $1\frac{6}{8}$, $2\frac{2}{3}$, $3\frac{2}{3}$, $4\frac{2}{3}$.

6. Change the following number to halves, and illustrate:

   $2\frac{1}{2}$, 4, $6\frac{1}{2}$, 9, 3, $7\frac{1}{2}$, 5, 1, $8\frac{1}{2}$, 10.

7. Change to thirds and illustrate:

   4, $7\frac{1}{3}$, 6, $5\frac{2}{3}$, 8, $9\frac{1}{3}$, 2, $1\frac{2}{3}$, 10, $3\frac{1}{3}$.

8. Change to fourths and illustrate:

   $9\frac{1}{4}$, 7, $5\frac{2}{4}$, 3, $1\frac{3}{4}$, 10, $8\frac{1}{4}$, 6, $4\frac{1}{4}$, $2\frac{3}{4}$.

To reduce fractional forms to whole or mixed numbers.

$$\frac{12}{4}$$

$$1 \quad + \quad 1 \quad + \quad 1 = 3$$

$$\frac{12}{4} = 3.$$

$$\frac{5}{2} = 2\frac{1}{2}.$$

NOTE. — How many fourths are there in the first square ? In the second ? In the third ? If we have 4 fourths in each square, how many squares do we need to have 12 fourths ? Let the pupils illustrate each example. Do not give them the usual rule at this point. That should come later if at all. Insist on neat, accurate drawings. Pupils trained to illustrate this lesson and the preceding one, get a clear and correct idea of fractions.

1. Change and illustrate :

$$\frac{6}{3}, \quad \frac{8}{4}, \quad \frac{12}{6}, \quad \frac{12}{4}, \quad \frac{18}{8}, \quad \frac{12}{3}, \quad \frac{12}{2}, \quad \frac{9}{3}, \quad \frac{15}{3}, \quad \frac{16}{4}.$$

2. Change and illustrate :

$$\frac{6}{8}, \quad \frac{11}{4}, \quad \frac{9}{8}, \quad \frac{13}{4}, \quad \frac{17}{7}, \quad \frac{7}{3}, \quad \frac{11}{5}, \quad \frac{13}{3}, \quad \frac{12}{5}, \quad \frac{10}{8}.$$

3. Change and illustrate :

$$3\frac{1}{3}, \quad 4\frac{2}{8}, \quad 5\frac{1}{4}, \quad 4\frac{3}{4}, \quad 3\frac{1}{3}, \quad \frac{8}{8}, \quad \frac{8}{8}, \quad \frac{10}{8}, \quad \frac{10}{6}, \quad \frac{11}{6}.$$

4. How many units (whole ones) in $\frac{15}{5}$?

5. How many fourths in 4 ?

6. Change to units :

$$\frac{8}{2}, \quad \frac{10}{5}, \quad \frac{18}{6}, \quad \frac{16}{5}, \quad \frac{18}{7}, \quad \frac{20}{8}, \quad \frac{27}{9}, \quad \frac{21}{9}, \quad \frac{25}{8}, \quad \frac{21}{7}.$$

7. Change to units :

$$\frac{33}{11}, \quad \frac{24}{8}, \quad \frac{36}{12}, \quad \frac{18}{9}, \quad \frac{40}{5}.$$

8. Change to fractional form :

$$6\frac{2}{3}, \quad 8\frac{1}{3}, \quad 5\frac{1}{4}, \quad 3\frac{2}{3}, \quad 5\frac{1}{4}, \quad 6\frac{3}{4}.$$

9. Change to mixed numbers :

$$\frac{9}{4}, \quad \frac{11}{3}, \quad \frac{9}{8}, \quad \frac{13}{4}, \quad \frac{17}{4}.$$

1. I saw a window in the shape of an isosceles triangle. How many square feet in the window if it is 4 ft. wide and 6 ft. high?

2. A boy gave away 4 cents, which was ⅓ of all he had. How many cents had he?

3. If 4 men can do a piece of work in 8 days, how many men can do it in one day?

4. A girl had 27 apples. She kept 7, and divided the rest equally among 5 of her playmates. How many apples did each playmate receive?

5. How many halves in 3½? Why?

6. How many dollars in 500 cents?

7. A boy had 68 cents in dimes and 2-cent pieces. How many dimes had he, if he had four 2-cent pieces?

8. A girl had 78 cents in her purse. If there were 3 quarters, how many cents did she have?

9. A man travels 9 hours a day for 36 hours. How many days does he travel?

10. If you buy a yard of ribbon for 27 cents, and a spool of thread for 5 cents, how much change will you receive back from a quarter and a dime?

11. Find ¼ of 24. ⅛ of 32. ⅑ of 81. ⅕ of 35.

12. Into how many parts must you divide an apple in order to give ⅔ of it to your brother? Why?

13. Into how many equal parts must you divide an apple in order to give your brother exactly ⅔ of it? Why?

14. In 5 pounds of coffee, how many thirds of a pound?

15. In 8 gallons, how many thirds of a gallon?

16. If 7 bbl. of flour cost $42, what will 4 bbl. cost?

17. If 4 tons of hay cost $48, what will 7 tons cost?

18. If 9 quarts of milk cost 54 cents, what will 7 quarts cost?

1. Change $6\frac{5}{6}$ to sixths.
2. Change $5\frac{3}{4}$ to fourths.
3. Change $4\frac{5}{8}$ to eighths.
4. Change $9\frac{3}{5}$ to fifths.
5. Change $\frac{7}{3}$ to a mixed number.
6. Change $\frac{14}{5}$ to a mixed number.
7. Change $\frac{13}{3}$ to a mixed number.
8. Change $\frac{23}{4}$ to a mixed number.
9. Change to whole or mixed numbers and illustrate:
   $\frac{7}{3}$, $\frac{4}{2}$, $\frac{12}{3}$, $\frac{8}{3}$, $\frac{9}{4}$, $\frac{10}{8}$, $\frac{12}{8}$, $\frac{6}{4}$, $\frac{9}{4}$, $\frac{11}{6}$.
10. Change to fractional form and illustrate:
    $4\frac{7}{8}$, $2\frac{3}{8}$, $3\frac{1}{8}$, $3\frac{3}{4}$, $4\frac{1}{2}$, $3\frac{1}{8}$, $5\frac{7}{8}$.
11. How many fourths of a yard in $4\frac{3}{4}$ yards?   In $6\frac{1}{4}$ yards?
12. How many eighths in $6\frac{5}{8}$ ft?   In $4\frac{5}{8}$ in.?   In $7\frac{3}{4}$ gal.?
13. How many fifths of a bushel in $7\frac{3}{5}$ bu.?   In $4\frac{3}{5}$ bu.? In $6\frac{4}{5}$ bu.?
14. How many pounds in 28-sevenths of a pound?
15. How many fifths in $3\frac{3}{5}$? $9\frac{1}{5}$? $6\frac{2}{5}$?
16. How many pints in $2\frac{1}{2}$ quarts?   How many halves in $4\frac{1}{2}$?   In $5\frac{1}{2}$?
17. How many feet in $6\frac{2}{3}$ yards?   How many thirds in $3\frac{1}{3}$? In $8\frac{2}{3}$?
18. How many pecks in $2\frac{3}{4}$ bushels?   How many fourths in $6\frac{1}{4}$?   In $8\frac{1}{4}$?
19. $\frac{10}{4} = ?$ $\frac{11}{8} = ?$ $\frac{9}{8} = ?$ $\frac{10}{6} = ?$
20. $\frac{11}{4} = ?$ $\frac{7}{3} = ?$ $\frac{28}{9} = ?$ $\frac{18}{3} = ?$
21. $\frac{27}{8} = ?$ $\frac{42}{8} = ?$ $\frac{19}{8} = ?$ $\frac{11}{2} = ?$
22. How many ninths in $3\frac{1}{9}$? $5\frac{5}{9}$? $6\frac{7}{9}$?
23. How many sixths in $5\frac{1}{6}$? $9\frac{5}{6}$? $4\frac{2}{6}$?
24. How many ones in $\frac{32}{5}$? $\frac{49}{8}$? $\frac{82}{9}$?
25. How many ones in $\frac{24}{4}$? $\frac{64}{9}$? $\frac{75}{8}$?
26. How many ones in $\frac{36}{7}$? $\frac{40}{9}$? $\frac{49}{8}$?

1. A man bought two farms for $9475. If he paid $3850 for one, what did the other cost?

2. How much larger is $57.00 than $29.75?

3. If one yard of silk costs $3, how many yards can you buy for $510?

4. Washington died in 1799. How many years ago did he die?

5. How many ones in $\frac{12}{4}$? $\frac{15}{5}$? $\frac{8}{3}$? $\frac{4}{3}$? $\frac{18}{6}$? $\frac{24}{8}$?

6. How many thirds in $4\frac{2}{3}$? $3\frac{1}{3}$? $2\frac{2}{3}$?

7. How many halves in $\frac{8}{16}$? $\frac{4}{4}$? $\frac{6}{12}$? $\frac{3}{8}$? $\frac{2}{4}$?

8. How many sixths in $\frac{1}{2}$? $\frac{1}{3}$?

9. Yesterday there were 376 pupils present in school, and 128 absent. How many pupils belong to the school?

10. How many quarts are there in 68 gallons?

11. How many quarts are there in 164 pints?

12. Add: $487.31, $78.12, $51.57, $4.36, $0.67, $25.34, $106.83, $57.50, $3.87.

13. Multiply:

By 9.		By 7.		By 5.		By 8.	
a.	1076	*a.*	276	*a.*	2667	*a.*	2452
b.	2004	*b.*	1045	*b.*	1079	*b.*	3563
c.	1105	*c.*	2706	*c.*	2307	*c.*	1704
d.	4674	*d.*	3043	*d.*	1486	*d.*	2476
e.	5089	*e.*	4078	*e.*	2454	*e.*	1046

14. Add:

2763	3693	4567	2176	7892
3854	4937	5678	4935	5465
6472	5486	6789	5864	7321
7987	8768	7896	3489	6574
8698	7879	8957	1797	5334
4549	6554	9434	7548	8287

1. Three-thirds of an apple equal how many apples?

2. Eight-fourths of an apple equal how many apples?

3. How many pieces of velvet, each half a yard long, can be cut from a piece 9½ yd. long?

4. Make an example to illustrate how to find the entire cost, when the cost of several articles is given.

5. How many cents in ¼ of a dollar?

6. What is the difference between ⅝ and ⅜? ½ and ¼?

7. How many fifths are there in 2? 3? 4? 5? 6?

8. If I lend you a $2 bill, and you pay me in half-dollars, how many must you give me?

9. Find the cost of 3 bu. of oats at ⅓ of a dollar a bushel.

10. If ½ doz. eggs cost 15 cents, what will 1 doz. cost? What will ⅓ doz. cost?

11. What is the value of 7 sheep at $9 a head?

12. What is the value of 12 sheep at $7 a head?

13. Find the cost of 12 pencils at 4¢ each.

14. What is the cost of a bushel of potatoes at 30¢ a peck?

15. What is ⅔ of 24? 36? 27?

16. A man pays $3 a month for his room-rent and $9 a month for his office-rent; how much rent does he pay a year?

17. If 12 boxes of oranges cost $72, what will 1 box cost? 9 boxes?

18. If 12 yd. of ribbon cost 96 cents, what will ⅓ as many yards cost?

19. Divide 24 into 2 equal parts.

20. Divide 16 into 4 equal parts.

21. What number must you multiply by 7 to get 84?

22. If a train goes 40 miles an hour, how many miles will it go in 15 minutes?

23. What do I receive for an article that cost me 60 cents, and which I sell at a loss of 15 cents?

1. A man paid $2675 for a lot, $4278 for a house, $1216 for a barn, and $496 for grading. What did the property cost him?

2. Four men formed a partnership. A put into the business $2760, B $2548, C $1416, and D $1676. What sum of money was invested in the business?

3. A merchant pays $780 a year for store rent, $1500 to one clerk, $1175 to another, $1250 to his book-keeper, and $479 for other purposes. What are the expenses of his business for one year?

4. Mr. Clark has an orchard, which contains trees as follows: — 49 cherry trees, 286 apple trees, 87 peach trees, 39 pear trees and 92 plum trees. In Mr. Kay's orchard are 115 cherry trees, 317 apple trees, 149 peach trees, 28 pear trees and 78 plum trees. Mr. Potter has 17 cherry trees, 248 apple trees, 72 peach trees, 49 pear trees and 55 plum trees. How many trees has Mr. Clark? Has Mr. Kay? Has Mr. Potter? How many cherry trees have they? How many apple trees? How many peach trees? How many pear trees? How many plum trees? How many trees in all?

5. The cash sales in a store for one week were as follows: — Monday $79.48, Tuesday $124.68, Wednesday $115.56, Thursday $87.24, Friday $91.47, Saturday $175.55. Find the total.

6. A owes the grocer $9.67, the butcher $12.48, the baker $4.15, help $18.50, coal-bill, $16.75 and tax-bill $19.41. How much money will it take to pay all his bills?

7. The area of Connecticut in square miles is 4845, of Massachusetts 8040, of Ohio 40,760, of Iowa 55,475, of Texas 262,290, of California 155,980, of Maine 22,895, of Virginia 40,125, of Rhode Island 1085. What is the area of all these states?

1. A farm was bought for $7549 and sold for $6188. What was the loss?

2. An army went into battle with 5128 men, and came out with only 2746 men. How many men were missing?

3. A man's income for a year is $6214. How much can he save if his expenses are $4725?

4. My house cost $6743 and my barn $1274. How much more did the house cost than the barn?

5. A house cost $7814. If $5968 have been paid how much still remains due?

6. The sum of two numbers is 8903 and one of them is 6497. What is the other number?

7. A's property is worth $8760 and B's is worth $2878 less. How much is B's property worth?

8. A cotton planter raised 8564 lb. of cotton. He sold 6857 lb. How many pounds had he left?

9. A horse and carriage cost $398 and were sold for $512. How much was gained?

10. There were 6203 votes cast for two candidates. The successful one received 4879. How many votes did the other receive?

11. A builder contracted to build a schoolhouse for $31,275. If it cost him $27,468, what were his profits?

12. A man began business with $2800 and at the end of the year had $3568. How much had he gained?

13. A merchant bought goods to the amount of $7563 and sold them for $11,630. How much did he gain?

14. B paid $7387 for a house and sold it for $7867. How much did he gain?

15. A man sold his farm for $2763 and paid $1975 for a house in the village. How much of his money had he left?

1. John solved 18 problems before school and 6 problems in school. How many problems did he solve?

2. Begin with 4, and count to 53 by 7's.

3. A garden contains 19 pear trees and 7 peach trees. How many trees in the garden?

4. Frank gave 12 cents for pencils, 5 cents for a rubber, and 6 cents for paper. How much did all cost?

5. A lady paid $27 for a shawl, $8 for a bonnet, and $3 for a pair of shoes. How much did she pay for all?

6. A boy paid 45 cents for a ball, 8 cents for marbles, and 7 cents for an orange. How much did he pay in all?

7. Charles's lesson consists of 15 examples, and he has solved all but 4 of them. How many has he solved?

8. Jennie is 16 years old, and her sister is 9 years younger. How old is her sister?

9. A man gave $15 for a saddle, and $6 for a bridle. How much did both cost? How much more did the saddle cost than the bridle?

10. Begin with 44, and count backwards by 4's.

11. Begin with 63, and count backwards by 7's.

12. From a cask containing 45 gal. of molasses, 39 gal. were sold. How many gallons remain unsold?

13. If a man earns $45 a month and spends $36, how much does he save?

14. Subtract by 4's from 70 back to 2.

15. Subtract by 6's from 87 back to 3.

16. Subtract by 9's from 86 back to 5.

17. Subtract by 7's from 66 back to 3.

18. Luther paid 20 cents for 4 bananas. How much was that for one?

19. 20 pounds of butter will last a family 5 weeks. How much butter do they use a week?
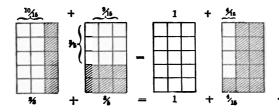
To show that the same fraction (part of a unit) may have different names; or to show how to find a common name (denominator) for different fractions.

	4ths	6ths	8ths	9ths	10ths	12ths	14ths	15ths	16ths	18ths	20ths	21sts	22ds	24ths
$\frac{1}{2}$	$\frac{2}{4}$	$\frac{3}{6}$	$\frac{4}{8}$		$\frac{5}{10}$	$\frac{6}{12}$	$\frac{7}{14}$		$\frac{8}{16}$	$\frac{9}{18}$	$\frac{10}{20}$		$\frac{11}{22}$	$\frac{12}{24}$
$\frac{1}{3}$		$\frac{2}{6}$		$\frac{3}{9}$		$\frac{4}{12}$		$\frac{5}{15}$		$\frac{6}{18}$		$\frac{7}{21}$		$\frac{8}{24}$
$\frac{1}{4}$	$\frac{1}{4}$		$\frac{2}{8}$			$\frac{3}{12}$			$\frac{4}{16}$		$\frac{5}{20}$			$\frac{6}{24}$
$\frac{1}{5}$					$\frac{2}{10}$			$\frac{3}{15}$			$\frac{4}{20}$			
$\frac{1}{6}$		$\frac{1}{6}$				$\frac{2}{12}$				$\frac{3}{18}$				$\frac{4}{24}$
$\frac{1}{7}$							$\frac{2}{14}$					$\frac{3}{21}$		
$\frac{1}{8}$			$\frac{1}{8}$						$\frac{2}{16}$					$\frac{3}{24}$
$\frac{1}{9}$				$\frac{1}{9}$						$\frac{2}{18}$				
$\frac{1}{10}$					$\frac{1}{10}$						$\frac{2}{20}$			
$\frac{1}{11}$													$\frac{2}{22}$	
$\frac{1}{12}$						$\frac{1}{12}$								$\frac{2}{24}$

NOTE. — Do not require the pupils to memorize this table. Teach them how to use it in order to find a common name. Many pupils will probably quickly learn the more common equivalents by referring to the table for a few lessons.

1. From the table, find what fractions are equal to $\frac{1}{3}$, and then illustrate as at the top of the page.

2. Do the same with $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$.

3. From the table, find what fractions are equal to $\frac{8}{16}$, $\frac{3}{12}$, $\frac{5}{15}$, $\frac{2}{8}$, $\frac{6}{18}$, $\frac{3}{9}$, $\frac{1}{10}$, $\frac{7}{14}$, $\frac{3}{15}$, $\frac{9}{18}$, $\frac{2}{20}$, $\frac{4}{16}$, $\frac{8}{16}$, $\frac{4}{12}$, $\frac{2}{8}$, $\frac{3}{18}$, $\frac{3}{21}$, $\frac{4}{20}$, $\frac{11}{22}$.

To add fractions not having a common denominator.

Illustrate the following as above :

1.	2.	3.	4.
$\frac{2}{3} + \frac{1}{2} = ?$	$\frac{1}{2} + \frac{3}{4} = ?$	$\frac{2}{4} + \frac{3}{5} = ?$	$\frac{2}{3} + \frac{3}{8} = ?$
$\frac{1}{2} + \frac{3}{4} = ?$	$\frac{2}{3} + \frac{4}{5} = ?$	$\frac{3}{4} + \frac{3}{5} = ?$	$\frac{2}{3} + \frac{4}{8} = ?$
$\frac{3}{3} + \frac{3}{4} = ?$	$\frac{1}{2} + \frac{4}{5} = ?$	$\frac{2}{4} + \frac{4}{5} = ?$	$\frac{3}{4} + \frac{4}{6} = ?$

5.	6.	7.	8.
$\frac{2}{3} + \frac{2}{7} = ?$	$\frac{2}{3} + \frac{5}{6} = ?$	$\frac{1}{2} + \frac{7}{8} = ?$	$\frac{1}{2} + \frac{5}{6} = ?$
$\frac{3}{5} + \frac{3}{10} = ?$	$\frac{2}{3} + \frac{7}{10} = ?$	$\frac{1}{2} + \frac{3}{8} = ?$	$\frac{2}{3} + \frac{4}{5} = ?$
$\frac{7}{12} + \frac{4}{5} = ?$	$\frac{2}{3} + \frac{3}{8} = ?$	$\frac{2}{4} + \frac{4}{8} = ?$	$\frac{3}{8} + \frac{7}{12} = ?$
$\frac{1}{2} + \frac{4}{5} = ?$	$\frac{2}{3} + \frac{4}{9} = ?$	$\frac{5}{6} + \frac{6}{12} = ?$	$\frac{1}{3} + \frac{2}{6} = ?$

9.	10.	11.	12.
$\frac{2}{3} + \frac{3}{4} = ?$	$\frac{1}{3} + \frac{5}{12} = ?$	$\frac{7}{8} + \frac{3}{4} = ?$	$\frac{1}{3} + \frac{8}{9} = ?$
$\frac{1}{2} + \frac{5}{8} = ?$	$\frac{4}{5} + \frac{9}{10} = ?$	$\frac{1}{4} + \frac{5}{8} = ?$	$\frac{5}{6} + \frac{7}{12} = ?$
$\frac{2}{3} + \frac{2}{5} = ?$	$\frac{3}{4} + \frac{10}{12} = ?$	$\frac{1}{4} + \frac{3}{8} = ?$	$\frac{1}{4} + \frac{3}{12} = ?$
$\frac{2}{3} + \frac{7}{9} = ?$	$\frac{1}{2} + \frac{4}{10} = ?$	$\frac{2}{3} + \frac{2}{8} = ?$	$\frac{3}{4} + \frac{5}{12} = ?$

13.	14.	15.	16.
$\frac{2}{3} + \frac{4}{8} = ?$	$\frac{1}{2} + \frac{3}{10} = ?$	$\frac{2}{4} + \frac{9}{12} = ?$	$\frac{1}{4} + \frac{1}{6} = ?$
$\frac{1}{3} + \frac{5}{6} = ?$	$\frac{2}{5} + \frac{3}{10} = ?$	$\frac{5}{6} + \frac{7}{12} = ?$	$\frac{2}{5} + \frac{2}{8} = ?$
$\frac{4}{5} + \frac{7}{10} = ?$	$\frac{1}{4} + \frac{3}{8} = ?$	$\frac{2}{6} + \frac{9}{12} = ?$	$\frac{1}{4} + \frac{3}{8} = ?$
$\frac{3}{5} + \frac{9}{10} = ?$	$\frac{2}{3} + \frac{4}{8} = ?$	$\frac{4}{6} + \frac{5}{12} = ?$	$\frac{3}{4} + \frac{4}{8} = ?$

$$\tfrac{9}{12} \quad - \quad \tfrac{1}{12} \quad = \quad \tfrac{5}{12}$$

Illustrate :

1.	**2.**	**3.**	**4.**
$\frac{2}{3} - \frac{1}{2} = ?$	$\frac{3}{4} - \frac{2}{3} = ?$	$\frac{7}{8} - \frac{2}{6} = ?$	$\frac{3}{5} - \frac{3}{10} = ?$
$\frac{1}{2} - \frac{1}{4} = ?$	$\frac{6}{8} - \frac{2}{3} = ?$	$\frac{5}{8} - \frac{2}{3} = ?$	$\frac{4}{6} - \frac{7}{12} = ?$
$\frac{3}{4} - \frac{1}{2} = ?$	$\frac{4}{5} - \frac{1}{2} = ?$	$\frac{5}{6} - \frac{3}{4} = ?$	$\frac{7}{12} - \frac{2}{5} = ?$

5.	**6.**	**7.**	**8.**
$\frac{5}{6} - \frac{2}{4} = ?$	$\frac{7}{8} - \frac{2}{4} = ?$	$\frac{6}{8} - \frac{2}{3} = ?$	$\frac{2}{3} - \frac{2}{8} = ?$
$\frac{4}{5} - \frac{2}{3} = ?$	$\frac{5}{12} - \frac{1}{4} = ?$	$\frac{5}{9} - \frac{1}{3} = ?$	$\frac{2}{3} - \frac{6}{8} = ?$
$\frac{7}{8} - \frac{5}{6} = ?$	$\frac{4}{12} - \frac{1}{3} = ?$	$\frac{4}{8} - \frac{2}{6} = ?$	$\frac{7}{8} - \frac{1}{2} = ?$

9.	**10.**	**11.**	**12.**
$\frac{5}{8} - \frac{1}{2} = ?$	$\frac{4}{6} - \frac{2}{3} = ?$	$1\frac{2}{5} - \frac{2}{3} = ?$	$\frac{4}{8} - \frac{2}{4} = ?$
$\frac{7}{8} - \frac{3}{4} = ?$	$\frac{3}{6} - \frac{1}{4} = ?$	$\frac{4}{5} - \frac{3}{4} = ?$	$\frac{5}{6} - \frac{6}{12} = ?$
$\frac{6}{8} - \frac{2}{4} = ?$	$\frac{8}{12} - \frac{3}{6} = ?$	$\frac{6}{10} - \frac{1}{2} = ?$	$\frac{2}{3} - \frac{4}{9} = ?$

13.	**14.**	**15.**	**16.**
$\frac{2}{3} - \frac{1}{4} = ?$	$\frac{3}{4} - \frac{5}{8} = ?$	$\frac{3}{5} - \frac{1}{2} = ?$	$\frac{2}{3} - \frac{3}{8} = ?$
$\frac{3}{4} - \frac{1}{3} = ?$	$\frac{1}{4} - \frac{1}{8} = ?$	$\frac{3}{4} - \frac{3}{5} = ?$	$\frac{3}{4} - \frac{4}{8} = ?$
$\frac{5}{6} - \frac{1}{2} = ?$	$\frac{1}{3} - \frac{1}{4} = ?$	$\frac{4}{5} - \frac{2}{4} = ?$	$\frac{2}{3} - \frac{2}{6} = ?$

17.	**18.**	**19.**	**20.**
$\frac{7}{12} - \frac{3}{8} = ?$	$\frac{7}{9} - \frac{2}{3} = ?$	$\frac{9}{10} - \frac{4}{5} = ?$	$\frac{1}{2} - \frac{3}{8} = ?$
$\frac{1}{3} - \frac{2}{6} = ?$	$\frac{4}{8} - \frac{5}{9} = ?$	$\frac{10}{12} - \frac{3}{4} = ?$	$\frac{8}{9} - \frac{2}{3} = ?$
$\frac{2}{3} - \frac{2}{8} = ?$	$\frac{5}{12} - \frac{1}{3} = ?$	$\frac{1}{2} - \frac{4}{10} = ?$	$\frac{5}{6} - \frac{7}{12} = ?$

1. 4 × 7½   19 − 12½   42½ − 11   68 + 17½
6 × 5½   83½ − 12   77½ + 11½   84½ − 7½

2. At ½ of a cent each, how many apples can I buy for 8 cents? 12 cents? 16 cents? 24 cents?

3. How many dozen marbles can I buy for 36 cents, at ½ a cent each?

4. If 4 cents is ½ of all the money you have, how much have you?

5. At 20¢ a peck, what will 6½ pecks of apples cost?

6. How many fourths are there in ½?

7. How much is two times ¼?

8. Two times ¼ are how many halves?

9. How much is 3 times ¼?

10. ¾ is how much larger than ½?

11. ¼ in. + ½ in. equals ——— of an inch?

12. How many fourths in the following: 1? 1¼? 1½? 1¾? 2? 2¼? 3¼? 4¾? 5½? 8¼?

13. If each of the following numbers are ½ of other numbers, what are those numbers: 8? 3? 1½? 3¾? 2¼? 6½? 7¼?

14. In ¾ of a peck there are how many quarts?

15. In ¾ of a bushel there are how many pecks?

16. ¾ of a foot and ½ of a foot are how many feet? How many inches?

17. If ½ a yard of cloth costs 6 cents, what will 2¾ yards cost?

18. ¼ is how many times ½?

19. 2 times ⅜ are how many fourths?

20. 4 times ½ are how many halves?

21. What will 1 bu. of chestnuts cost at 10 cents a quart?

22. If a man walks 4 miles an hour for 5 hours a day, how many days will he take to walk 100 miles?

23. If 4 balls cost $1, how many dollars will 84 balls cost?

24. Paid $32 for 16 yards of cloth. What did it cost a yard?

Division is the process of finding how many times one number is contained in another; or of finding one of the equal parts of a number.

The *dividend* is the number to be divided.

The *divisor* is the number by which we divide.

The *quotient* is the number of times the dividend contains the divisor.

```
    126
6)756
    6
   ‾‾
   15
   12
   ‾‾
   36
   36
```

Write the numbers as in short division. 6 is contained in 700, 1 hundred times. Write the 1 above the 7. Once 6 is 6; write it below the 7 and subtract. Our remainder is 1 hundred, or ten tens, which with the 5 tens makes 15 tens. 6 is contained in 15 tens, 2 tens times, which is written above in the column of tens. 6 times 2 tens are 12 tens. Place this below the 15 tens and subtract. Our remainder is 3 tens or 30 units, and 6 units more make 36 units. 6 is contained in 36 units 6 units times. Place the 6 units above in the column of units. 6 times 6 units are 36 units, which subtracted from 36 units leaves no remainder.

NOTE. — There will be no trouble in teaching Long Division if care is taken to lead the pupils to see that by this way all the work is expressed on paper, and that is the reason why it is longer for such examples as the illustration. If they ask why we use a long way for doing examples, let them see that short ways are sometimes too difficult.

Avoid the expression "bring down the 5, etc.," as we do nothing of the kind.

1. 8) 792   9) 819   3)4272   4)4256   6)3642

2. 7)6307   8)7264   9)6489   9)5481   7)6517

3. 7)2268   8)2936   8)3384   9)2097   9)2925

4. 7)2562   6)1476   8)7576   9)6327   8)6736

5. 6)1476   7)7868   6)2514   8)6736   5)5670

6. 8)2936   9)3978   8)7056   6)3336   4)7132

```
  36
20)720
  600
  120
  120
```

20 is contained in 72 tens 3 tens times. Place the 3 tens above the tens figure. 20 times 3 tens are 60 tens, which subtracted from 72 tens leaves 12 tens. 12 tens equal 120 units. 20 is contained in 120 units 6 units times. 20 times 6 units are 120 units, which subtracted from 120 units leaves no remainder.

1. Divide 26220 by 20.		**2.** Divide 49260 by 20.	
3. Divide 45760 by 20.		**4.** Divide 36390 by 30.	
5. Divide 98640 by 40.		**6.** Divide 57600 by 50.	
7. Divide 678420 by 20.		**8.** Divide 7896840 by 70.	
9. Divide 4568960 by 80.		**10.** Divide 69872840 by 40.	
11. Divide 1728 by 36.			

```
   48
36)1728
   144
   288
   288
```

30 is contained in 172 tens how many tens times? 30 times 5 tens are how many? Take 150 from 172, how many are left? 6 times 5 tens are how many? Can 30 tens be taken from 22 tens? Does this prove that 36 is contained in 172 only 4 times? After determining the quotient figure 4 the explanation is the same as above. Perform this same work for yourself in determining the units figure of the quotient.
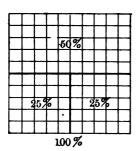
12. Divide 2448 by 51.		**13.** Divide 4392 by 61.	
14. Divide 3969 by 81.		**15.** Divide 1323 by 21.	
16. Divide 1365 by 21.		**17.** Divide 1764 by 21.	
18. Divide 2976 by 31.		**19.** Divide 3075 by 41.	
20. Divide 3264 by 51.		**21.** Divide 4758 by 61.	
22. Divide 1848 by 21.		**23.** Divide 4459 by 91.	
24. Divide 3038 by 31.		**25.** Divide 4615 by 71.	
26. Divide 6237 by 81.		**27.** Divide 2928 by 61.	
28. Divide 5187 by 91.		**29.** Divide 2079 by 21.	
30. Divide 2583 by 41.		**31.** Divide 2697 by 31.	
32. Divide 3654 by 87.		**33.** Divide 47106 by 18.	
34. Divide 468096 by 46.		**35.** Divide 340092 by 67.	
36. Divide 7875 by 35.		**37.** Divide 2952 by 24.	
38. Divide 4494 by 14.		**39.** Divide 10725 by 33.	

1. Divide 2622 by 23.	2. Divide 4925 by 25.
3. Divide 5760 by 24.	4. Divide 3240 by 72.
5. Divide 1960 by 56.	6. Divide 5945 by 29.
7. Divide 2944 by 64.	8. Divide 7055 by 83.
9. Divide 8568 by 56.	10. Divide 2944 by 64.
11. Divide 5460 by 26.	12. Divide 5092 by 76.
13. Divide 6336 by 33.	14. Divide 2304 by 72.
15. Divide ·3780 by 15.	16. Divide 7884 by 54.
17. Divide 1260 by 42.	18. Divide 4960 by 32.
19. Divide 7644 by 91.	20. Divide 4738 by 23.
21. Divide 2697 by 87.	22. Divide 1462 by 34.
23. Divide 1560 by 24.	24. Divide 4640 by 32.
25. Divide 3450 by 75.	26. Divide 7876 by 44.
27. Divide 3910 by 85.	28. Divide 9856 by 56.
29. Divide 6825 by 65.	30. Divide 7828 by 76.
31. Divide 3486 by 83.	32. Divide 5772 by 74.
33. Divide 8774 by 82.	34. Divide 7533 by 81.
35. Divide 2365 by 55.	36. Divide 4662 by 63.
37. Divide 8924 by 92.	38. Divide 5904 by 82.
39. Divide 9828 by 91.	40. Divide 6716 by 73.
41. Divide 7896 by 21.	42. Divide 19885 by 41.
43. Divide 11408 by 31.	44. Divide 9744 by 21.
45. Divide 228191 by 31.	46. Divide 23868 by 51.
47. Divide 45445 by 61.	48. Divide 366212 by 41.
49. Divide 53136 by 81.	50. Divide 39767 by 91.
51. Divide 48426 by 21.	52. Divide 48351 by 71.
53. Divide 46008 by 81.	54. Divide 14916 by 22.
55. Divide 14656 by 32.	56. Divide 35448 by 42.
57. Divide 72009 by 81.	58. Divide 37392 by 82.
59. Divide 420484 by 62.	60. Divide 10994 by 23.
61. Divide 18791 by 43.	62. Divide 209576 by 68.
63. Divide 60466 by 49.	64. Divide 195548 by 76.

1. What change ought you to receive from a quarter-dollar, after paying for 6 oranges at 3¢ each?

2. ⅛ of 64 is ——?   9 is ⅓ of ——?

3. Find the cost of 7 pails at 12¢ each.

4. How many feet in 96 inches?

5. The sides of a triangle measure 8 in., 9 in., and 7 in. respectively. Find the distance round it.

6. If my brother lives 17 years longer, he will be 35 years old. How old is he?

7. 18 is the product of what two numbers? Of what other two numbers?

8. How much farther is it round a 5-inch square than round a 2-inch square?

9. What change shall I receive from $1 for purchases amounting to:

¢	¢	¢	¢	¢	¢	¢	¢	¢	¢
45	37	68	72	44	35	11	95	87	31
76	28	37	75	55	22	16	9	80	33
43	94	68	27	66	30	60	90	70	20
82	86	91	32	77	34	41	61	46	36
65	15	14	48	88	72	89	92	17	99

10. Find the cost of 1 pair of gloves at 20 cents, and 1 yd. of ribbon at 17 cents.

11. Find the cost of 4 lb. of sugar at 5¢ a pound, and 2 lb. of rice at 5¢ a pound.

12. A boy was carrying 60 eggs to market, but broke ⅓ of them. How many did he break?

13. How many would he have broken if he had broken ⅓ of them? ¼?

14. What must you pay for 15 postal cards and 10 2-cent stamps?

The square diagram shows a 10x10 grid labeled with 50% in the upper area, 25% and 25% in the lower areas, and 100% below the square.

1. Into how many parts is the square divided?

2. What will 1 part be called?

3. Make a square and divide it into 100 equal parts.

4. Point to $\frac{1}{100}$ of your square.

5. Point to $\frac{8}{100}$ of it.

6. Cross off 25 parts, or $\frac{25}{100}$ of the whole square.

7. Can you tell by looking what part of the whole square you have crossed off?

8. Then $\frac{1}{4}$ is how many $\frac{}{100}$?

9. Instead of saying 25 one hundredths, we say 25 per cent; because per cent means "by the hundred."

10. Look at the square at the top of the page, and see how we write per cent. Write 25%.

11. Draw a rectangle 4 in. by 1 in. Cross off 25% of it.

12. Look at the square at the top of the page, and tell what part of the square is 50% of it.

13. 50% of a square is —— of it?

14. Draw a line 4 in. long. Cross off 50% of it. 25% of it. 100%.

15. What part of a circle is 100% of it? 50% of it? 25% of it?

16. $\frac{1}{2}$ of a circle is what per cent of it?

17. $\frac{1}{4}$ of a circle is what per cent of it?

18. Which is larger, 25% of an orange, or 50% of it?

19. What is 25% of 16 cents? 100% of 25 cents?

20. What is 50% of 16 cents? Of 24 cents?

21. What is 25% of $12? $48? $32?

22. What is 50% of $10? Of $18? $40?

23. What is 50% of $100? Of $60? $1?

1. John had 80 marbles, and lost 25% of them. How many did he lose? How many did he have left?

2. Mary had 60 cents, and spent 50% of them. How many did she spend? How many did she have left?

3. A farmer had 50 sheep, and lost 50% of them. How many had he left?

4. A man had $400, and spent 25% of it, and put 50% of it in the bank. How much money did he spend? How much did he put in the bank?

5. A farmer had 80 chickens, but a hawk caught 25% of them. How many did the hawk catch? How many did the farmer have left?

6. A had $200; B had 50% as much. How much had B?

7. A coat that cost $18 was sold at a loss of 50%. How much was lost? For how much was the coat sold?

8. A man bought a cow for $20, and sold it so as to gain 25%. How much did he gain? For how much did he sell the cow?

9. If you had 20 cents, and spent 10 cents, what part of your money did you spend? What per cent of it did you spend?

10. Ida spent 6 cents, which was 25% of all she had. How much money had she?

11. In an orchard there are 60 trees. If 25% of them are apple trees, how many apple trees are there?

12. Draw a rectangle 10 in. by 4 in. Cross off 50% of it. Cross off 25% of what is left.

13. Find 50% of 200; of 60; 24; 18; 20; 400.

14. A regiment of 800 men lost 25% of its men in battle. How many men did it lose?

15. A farmer had 120 sheep, and sold 25% of them. How many sheep did he have left?

1. Fred had 50 marbles, and Edward had 25. If Fred should buy ⅔ of Edward's marbles, how many would each have then?

2. Jerry earns $53 a month. If he spends $20 and pays $5 a week for his board, how much money does he save in a month?

3. Peter sold his knife so as to gain 9 cents; if this was ⅓ of what he paid for it, how much did he pay for it? For how much did he sell it?

4. A merchant packed 5 doz. hats in boxes. If he put 6 hats in each box, how many boxes did it take?

5. If my watch loses 5 min. a day, how many hours will it lose in 1 week and 5 days?

6. Lucy is 4½ yr. old, and her cousin Harry is twice as old. How old is he?

7. George worked 3 days and earned 6 cents a day. He gave his sister 3 cents, and spent ⅓ of what was left. How much had he then?

8. Nellie had 9 plums. If she ate ⅓ of them, and gave away ½ of what was left, how many did she have then?

9. What is $\frac{1}{10}$ of 60? ¼ of 84? ⅓ of 90? ⅕ of 100?

10. If out of a gallon of vinegar I use a pint a day, how much shall I have at the end of 4 days?

11. I bought a dozen eggs at a cent and a half each. I used 5 and sold the rest at 2¢ each. How much more did I pay out than I received?

12. A man bought a watch for $37, but found he had only $24 with him. How much more does he need to pay for the watch?

13. A watch cost $40. For how much must it be sold to gain $13?

14. What will 3 lb. of sugar cost at 8¢ a pound?

15. A man earns $8 in a week. In what time will he earn $56?

(Review page 7.)

$$
\begin{array}{r}
456 \\
237 \\
\hline
3192 \\
13680 \\
91200 \\
\hline
108072
\end{array}
\qquad
\begin{array}{rcr}
456 \times & 7 & 3192 \\
456 \times & 30 & 13680 \\
456 \times & 200 & 91200 \\
\hline
456 \times 237 = & & 108072
\end{array}
$$

NOTE. — Let the pupils omit the unnecessary ciphers as soon as possible.

Multiply:

1. 437 by 679 628 by 423 332 by 434
   904 by 485 321 by 391 434 by 678
   935 by 429 648 by 346 725 by 642
   539 by 732 871 by 735 802 by 724

2. 484 by 424 743 by 355 706 by 546
   620 by 912 168 by 218 904 by 867
   471 by 168 830 by 577 514 by 474
   617 by 433 605 by 768 812 by 357

3. 625 by 339 743 by 657 561 by 457
   237 by 195 387 by 235 518 by 546
   608 by 768 482 by 135 629 by 387
   257 by 246 372 by 274 348 by 523

4. 418 by 625 437 by 434 297 by 824
   408 by 316 621 by 297 792 by 382
   683 by 672 763 by 468 719 by 338
   811 by 725 234 by 496 563 by 678

5. 1621 by 457 5682 by 543 9238 by 858
   1763 by 468 2573 by 761 7779 by 827
   1234 by 496 3871 by 873 9787 by 558
   4185 by 368 5482 by 135 7601 by 759
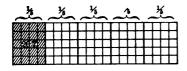
1. What will 76 horses cost at an average price of $175 each?

2. What will 516 bu. of grass seed cost at $3.05 a bushel?

3. What will 486 boxes of oranges cost at $5.25 a box?

4. An army is composed of 268 regiments. If there are 987 men in each regiment how many men are there in the army?

5. A square mile contains 640 acres. How many acres are there in 486 square miles?

6. The cost of building a certain road was on the average $1567 a mile. What was the cost of 456 miles of this road?

7. If a grist mill grinds 4206 bu. of corn in a day, how many bushels will it grind in 294 days?

8. A mile contains 5280 feet. How many feet are there in 254 miles?

9. The multiplicand is 976 and the multiplier 763; what is the product?

10. If one acre of land costs $76, what will 672 acres cost?

11. What is the weight of 849 bbl. of flour, each weighing 196 pounds?

12. A manufacturer sold 1465 pieces of cloth, each piece containing 56 yd. How many yards did he sell?

13. There are 168 hours in one week. How many hours are there in 408 weeks?

14. How much will a mechanic earn in 312 days, at the rate of $2.15 a day?

15. When wheat is worth $1.09 a bushel, what is the value of 547 bushels?

16. A man spent $865 in a year. How much would he spend at the same rate in 37 years?

17. There are 63 gallons in a hogshead. How many gallons are there in 456 hogsheads?

1. If I buy peaches at the rate of three peaches for 5 cents, what will 6 peaches cost? What will 9 peaches cost?

2. Divide the following numbers by 2 : — 84, 102, 246, 468, 286, 462, 682.

3. Divide the following numbers by 3 : — 66, 99, 366, 393, 639, 969, 636, 723.

4. Divide the following numbers by 4 : — 48, 208, 124, 244, 164, 200, 212.

5. Add 42 and 67; 37 and 68; 74 and 35; 75 and 43; 24 and 72.

6. The area of a rectangle is 96 sq. ft. Find the width if the length is 12 ft.

7. Find the width of a rectangle that is 20 ft. long, and contains 90 sq. ft.

8. The surface of a door contains 28 sq. ft. If its length is 8 ft., how wide is it?

9. Change 76 qt. to pecks.

10. Change 125 inches to feet.

11. Add $6\frac{1}{2}$ and $4\frac{1}{2}$; $2\frac{3}{4}$ and $4\frac{1}{3}$; $3\frac{3}{4}$ and $7\frac{3}{4}$.

12. Change to improper fractions : — $6\frac{3}{4}$, $8\frac{3}{4}$, $3\frac{1}{2}$, $7\frac{3}{4}$.

13. Change to mixed numbers : — $\frac{26}{4}$, $\frac{37}{5}$, $\frac{42}{4}$, $\frac{52}{8}$, $\frac{38}{6}$.

14. How many square inches are there in a square 12 in. long? In a square 11 in. long?

15. How many square inches are there in an oblong 12 in. long and 11 in. wide? In an oblong 1 ft. 6 in. long and 10 in. wide?

16. The product of two numbers is 72. One of the numbers is 8, what is the other number?

17. What is the length of a square containing 64 sq. ft.?

18. Divide 246 by 3; 248 by 4; 550 by 5; 582 by 6.

19. Divide 824 by 4; 755 by 5; 369 by 3; 427 by 7.

20. Divide 168 by 8; 279 by 9; 567 by 7; 865 by 5.

Divide 11375 by 325.

The explanation for dividing by three figures is so similar to that for division by two figures that it is not necessary to repeat it here.　See page 17.

```
        35
325)11375
      975
     1625
     1625
```

Divide :

1.	2480 by 124;	4494 by 321.
2.	10950 by 365;	7875 by 225.
3.	12560 by 314;	22824 by 317.
4.	47412 by 108;	10725 by 325.
5.	64440 by 120;	3168 by 132.
6.	54576 by 144;	3780 by 315.
7.	5616 by 234;	1107 by 123.
8.	8316 by 231;	7614 by 282.
9.	68952 by 221;	3813 by 123.
10.	63336 by 203;	678273 by 321.
11.	549360 by 327;	24416 by 436.
12.	18144 by 144;	18144 by 288.
13.	428752 by 254;	936716 by 349.
14.	658749 by 247;	948660 by 978.
15.	688832 by 458;	847590 by 285.
16.	843660 by 327;	955980 by 452.
17.	676269 by 759;	985500 by 675.
18.	828852 by 578;	317646 by 126.
19.	238788 by 134;	456104 by 146.
20.	603264 by 192;	811332 by 372.
21.	11286 by 418;	13872 by 408.
22.	17500 by 625;	24588 by 683.
23.	25536 by 672;	31629 by 811.
24.	29725 by 725;	28896 by 672.
25.	54576 by 379;	12560 by 314.
26.	64440 by 537;	10950 by 365.
27.	47412 by 439;	518077 by 763.
28.	22824 by 317;	339720 by 456.

1. A man has $1200 to invest in land. How many acres can he buy at $125 an acre?

2. A man paid $22515 for 237 acres of land. How much did the land cost an acre?

3. I bought 76 carriages for $16188. What was the average cost of each carriage?

4. At the rate of $129 an acre, how many acres can be bought for $322242?

5. If a ship sails 387 miles every day, in how many days will it sail 13932 miles?

6. At 43 miles an hour, how long will it take a train to run 3354 miles?

7. At the average price of $47 how many pieces of cloth can be bought for $3572?

8. The product of two numbers is 10707, and one of the numbers is 129. What is the other number?

9. The divisor is 979 and the dividend 878,163. What is the quotient?

10. A ship sailed 13750 miles in a voyage of 250 days. How many miles did the ship sail on the average each day?

11. What is the multiplicand when the product is 1,123,482 and the multiplier 246?

12. There are 320 rd. in a mile. How many miles are there in 51200 rods?

13. How many bales will 1,072,512 lb. of cotton make, allowing 294 lb. to the bale?

14. A drover bought 743 cattle for $18575. What was the average price of each?

15. If a man travels 34 miles a day, how long will it take him to travel 2210 miles?

16. If a farm of 84 acres costs $1233.96, what is the price of one acre?

Fig. 1.

Fig. 2.
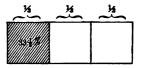
How many little squares in Fig. 1? How many are crossed off? If 20 parts out of 100 parts are crossed off, what per cent is crossed off? What is ⅕ of 100%?

Into how many parts is Fig. 2 divided? What part of the whole is crossed off? What is ⅓ of 100%?

1. What part of the whole rectangle is 20% of it?
2. What part of the whole rectangle is 33⅓% of it?
3. What is 33⅓% of $12? $18? $27?
4. What is 20% of $15? $25? $35?
5. What is 25% of 80 quarts? Of 64 gal.? $120?
6. What is 50% of 400 books? Of $150? 78 pencils?
7. What is 33⅓% of 99 horses? Of $66? Of 300 men?
8. What is 20% of 100 chickens? Of 80 books?
9. What is 20% of 50? 100? 135?
10. If you had 75¢, and should spend 33⅓% of it, how many cents would remain?
11. Find 33⅓% of 333. Find 25% of 444.
12. Find 20% of 555. Find 100% of 100.
13. A boy has 24 cents, and his brother has ¼ as many. How many cents has his brother?
14. A boy has 24 cents, and his brother has 25% as many. How many cents has his brother?
15. Mary had 12 oranges, and gave her brother 50% of them. How many did she give her brother?
16. Mary has 25 pears, and her sister has 20% as many. How many has her sister?

1. 12 is 25% of what number?
2. 9 is 25% of what number?
3. 40 is what per cent of 40?
4. 2 is what per cent of 2?
5. 5 is what per cent of 20?
6. 4 is what per cent of 20?
7. 9 is 50 % of what number?
8. 8 is 25% of what number?
9. 6 is what per cent of 24?
10. If I use 6 sheets from a quire of paper, what part of the whole do I use? What per cent of the whole do I use?
11. 6 is what per cent of 24?
12. If you have 20 cents, and spend 10 cents, what part of your money do you spend? What per cent of it do you spend?
13. 10 is what per cent of 20?
14. 25% of $80 is how many dollars?
15. I have a box containing 15 bunches of envelopes. If I use 33⅓% of them, how many bunches do I use?
16. If you had 20 examples to do for your number lesson, and did 100% of them correctly, how many did you do?
17. A basket of wood, which weighed 50 lb., stood out in the rain. When wet it was found to have gained 20% in weight. How much did it weigh then?
18. If you paid 12 cents for a dozen apples, for how much must you sell them to gain 50%?
19. Grace spent 5 cents this morning, which was 25% of all the money she had. How much money had she?
20. 5 is 25% of what number? 50% of what number?
21. 6 is 33⅓% of what number? 20% of what number?
22. A man bought a cart for $20, and sold it at a loss of 25%. What did he get for the cart?
23. If a horse cost $80, at what price must it be sold to gain 25%?

1. Find 50% of $40. 33⅓ of 36 oranges. 25% of 88 rabbits.

2. If you have 20 problems in your arithmetic lesson, and miss 25% of them, how many will you solve?

3. If you have 20 problems in your arithmetic lesson, and solve 20% of them, how many will you miss?

4. Alice had 21 plums, and gave ⅓ of them to her brother Edward. How many plums did she give to her brother?

5. Alice had 21 plums, and gave 33⅓% of them to her brother Edward. How many plums did she give to her brother?

6. Jack had 20 oranges, and sold 50% of them. How many did he sell?

7. Jack had 20 oranges, and sold ⅓ of them. How many did he sell?

8. If you had a quarter of a dollar and spent 20% of your money, how much did you spend?

9. What is 20% of $150?

10. A boy had 160 marbles and lost 25% of them. How many did he lose?

11. What is 50% of one thousand?

12. What is 33⅓% of $369?

13. A man owned 178 acres of land and sold 50% of it. How much did he have left?

14. A boy had 162 marbles and lost 33⅓% of them. How many did he have left?

15. Which would you rather have, $1 or 50% of $2?

16. Which would you rather have, $1 or 100 % of $1?

17. Which would you rather have, 25% of $20 or 20% of $25?

18. Find 33⅓% of $150. $270. $642.

19. What fraction is equivalent to 25%? 33⅓%? 50%? 20%?

1. A farmer sold his horse for $200 and received 25% of that sum in cash.

2. A man owned 440 hens and sold 50% of them.

3. 360 pupils is 50% of all the pupils in our school.

4. There are 700 pupils in a certain school building. 25% of them are in the first and second grades.

5. $150 is $33\frac{1}{3}$% of my money.

6. I bought an article for $4 and sold it for $3.

7. I bought an article for $20 and sold it at a gain of 20%.

8. I bought an article for $30 and in selling it I gained $33\frac{1}{3}$%.

9. The cost of an article was $15 and the rate of gain 20%.

10. The cost of my house was $1800, but I sold it at a gain of $33\frac{1}{3}$%.

11. A farmer paid 20% of $250 for a cow.

12. A dealer bought $33\frac{1}{3}$% of 360 bbl. of apples.

13. A man's yearly income was $2700. He put $33\frac{1}{3}$ of it into the savings bank.

14. A man had $1800 in the bank and drew out 50% of it to pay for a building lot.

15. Coal cost $6 a ton last year. This year the price is $33\frac{1}{3}$% more than it was last year.

16. I inquired the price of cloth and found that it was 60¢ a yard. I bought 50% of a yard.

17. My grocer paid 80 cents a bushel for potatoes. He sold me a bushel at a gain of 20%.

18. The goods in a store were valued at $5000. The owner lost 25% of them by a fire.

19. On the last stormy day 20% of the pupils were absent. When all are present there are 450 pupils in the building.

20. A owned 360 acres of land and sold $33\frac{1}{3}$% of it to B.

1. If you divide 25 cents into 5 equal parts, what is the value of each part?

2. Find:

$\frac{3}{4}$ of 48	$\frac{3}{5}$ of 45	$\frac{4}{11}$ of 44	$\frac{4}{11}$ of 121
$\frac{5}{6}$ of 30	$\frac{4}{9}$ of 42	$\frac{4}{9}$ of 56	$\frac{3}{4}$ of 400
$\frac{4}{7}$ of 28	$\frac{9}{10}$ of 70	$\frac{4}{5}$ of 45	$\frac{5}{6}$ of 600
$\frac{7}{8}$ of 72	$\frac{8}{13}$ of 24	$\frac{3}{8}$ of 24	$\frac{4}{9}$ of 49
$\frac{5}{8}$ of 24	$\frac{5}{6}$ of 27	$\frac{3}{8}$ of 33	$\frac{7}{13}$ of 72
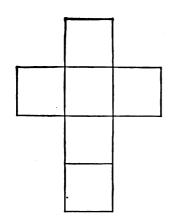
3. How many chains at $3 each can I buy for $21?

4. At $7 a week, how many weeks can I board for $63?

5. What will $\frac{1}{4}$ of a pound of chocolates cost at 36¢ a pound?

6. What will $\frac{1}{2}$ of a pound of pepper cost at 18¢ a pound?

7. Find the cost of 17 eggs at 12¢ a dozen?

NOTE. — Since each removal of a figure one order to the left multiplies its value by 10, the annexing of one cipher to any number multiplies that number by 10; the annexing of two ciphers multiplies it by 100.

8. How many are:

10×23?	10×16?	$\frac{1}{10}$ of 230?	$\frac{1}{10}$ of 160?
10×36?	10×72?	$\frac{1}{10}$ of 450?	$\frac{1}{10}$ of 720?
10×45?	10×88?	$\frac{1}{10}$ of 360?	$\frac{1}{10}$ of 880?
10×32?	10×91?	$\frac{1}{10}$ of 320?	$\frac{1}{10}$ of 910?

9. Multiply:

18 by 10	5 by 100	8 by 10	8 by 100
27 by 10	25 by 100	12 by 10	12 by 100
63 by 10	32 by 100	16 by 10	16 by 100
95 by 10	76 by 100	20 by 10	20 by 100

10. Divide:

760 by 10	800 by 100	6500 by 100	80 by 10
890 by 10	1600 by 100	8800 by 100	200 by 10
420 by 10	2400 by 100	400 by 100	1000 by 10

11. Three girls have together 35 cents; the first has 13 cents, and the other two have just the same number. How many have they?

This illustration is drawn to a scale ¼. Cut this form out of paper of the proper size, and fold on the lines.

1. What form have you?

2. How many sides has your cube?

3. How many squares in the figure?

4. Of what then is each square of the figure an illustration?

5. What is the area of the entire surface of your 2-inch cube?

6. Show how you find the area of the surface of the cube by means of the figure at the top of the page.
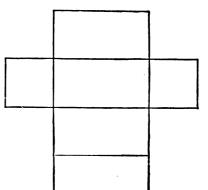
Find the entire surface of the following cubes, and make an illustration for each:
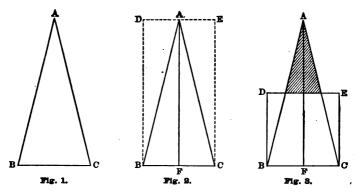
7. A 3-inch cube.   Scale ¼.   **8.** A 4-inch cube.   Scale ¼.

9. A 2-foot cube.   Scale 1 in. to a foot.

10. A 4-foot cube.   Scale ½ in. to a foot.

This illustration is to show the entire surface of a rectangular block or prism, 4 in. long, 2 in. wide, and 2 in. thick.   Scale ¼.

Find the entire surface of the following, making illustrations:

11. A prism, 6 in. by 4 in. by 4 in.   Scale ¼.

12. A prism, 8 in. by 6 in. by 6 in.   Scale ¼.

13. A prism, 6 in. by 8 in. by 2 in.   Scale ¼.

14. A prism, 5 in. by 5 in. by 8 in.   Scale ¼.

Fig. 1.   Fig. 2.   Fig. 3.

1. What is the figure A B C called? (Fig. 1.)

2. How does the side A B compare in length with A C?

3. When two sides of a triangle are equal, we call it an Isosceles triangle.   Write the word.   Learn to spell it.

4. What is an Isosceles triangle?

5. B D E C (Fig. 2) is what figure?

6. What part of the rectangle, B D E C, is the triangle, A B C?   How do you know it?

7. If B C is 2 in. and A F is 4 in., what is the area of the rectangle?

8. What then would be the area of the triangle, A B C?

9. In Fig. 3, how was the rectangle, B D E C, made from the triangle, A B C?

10. How does the area of the rectangle, B D E C, compare with the area of the triangle, A B C?

11. How does the height of this rectangle compare with the height of the triangle?

12. If the height of the triangle is 4 in., what is the height of the rectangle?

13. If the base of the triangle is 2 in. and the height is 4 in., what is the area of the rectangle, B D E C?

1. Reduce to whole or mixed numbers : $\frac{14}{4}$, $\frac{13}{3}$, $\frac{25}{6}$, $\frac{79}{9}$, $\frac{11}{7}$.

2. Reduce to improper fractions : $5\frac{3}{8}$, $12\frac{3}{8}$, $4\frac{5}{8}$, $3\frac{3}{4}$, $6\frac{1}{2}$.

3. What is $\frac{1}{4}$ of 20 ? 36 ? 48 ? 56 ? 72 ?

4. What is $\frac{1}{3}$ of 21 ? 27 ? 30 ? 36 ? 48 ?

5. What is $\frac{1}{5}$ of 15 ? 30 ? 40 ? 45 ? 60 ?

6. If 6 cords of wood cost $48, what is the price a cord ?

7. How many oranges can I buy for 48 cents, at the rate of 8¢ each ?

8. How many oranges at 4¢ each are worth as much as 8 lemons at 5¢ each ?

9. How many are 15 plus 5, divided by 5 ?

10. How many are 18 plus 6, divided by 6 ?

11. How many are 40 plus 8, divided by 8 ?

12. How many are 35 plus 7, divided by 7 ?

13. At 80¢ each, how much will 9 arithmetics cost ?

14. Mason earned $15 a week, and paid $7 for his board ? How much could he save in 8 weeks ?

15. If 6 men can do a piece of work in 20 days, how long will it take 1 man to do it ?

16. In an orchard there are 16 rows of trees, and 10 trees in each row. How many trees are there in the orchard ?

17. Arnold earned $18 a week, and paid $9 a week for his board. How much could he save in 8 weeks ?

18. How many are 3 times 5, plus 6 ? 5 times 6, plus 7 ? 6 times 7, plus 8 ? 7 times 8, plus 9 ? 9 times 10, plus 11 ? 12 times 10, plus 10 ?

19. A boy paid 15 cents for $\frac{3}{4}$ of a pie. What was the price of the whole pie ?

20. Three pecks is what part of a bushel ? What per cent of a bushel ?

21. A dozen bottles of ink are worth 60 cents. How many bottles can I buy for 45 cents ?

1. A field, in the shape of a rectangle, is 275 yards long and 105 yards wide. How many yards of fence will it take to enclose it?

2. Multiply 983 by 56.

3. Divide 9575 by 25.

4. Find the cost of 12 coats at $18.75 each.

5. A farmer raised 57¾ bu. of wheat. He used 10½ bu. for flour, and kept 8½ bu. for seed. How many bushels were left?

6. A grocer sells 1½ lb. of butter for 48 cents. How many half-pounds does he sell? How much is 1 half-pound worth? How much is one pound worth?

7. A storekeeper charges 75 cents for ¾ of a yard of silk. How much does he charge for each quarter of a yard? How much for 1 yard?

8. Add 14½, 13¼, 12¼.

9. From 70¼ take 56¼.

10. How many pints of milk in 24 gallons?

11. A farmer paid $1500 for 25 cows. What was the cost of a cow?

12. Paid 15 cents for a quart of molasses. What will 15 gallons cost at the same rate?

13. Add 27¾ and 20⅔.

14. Divide 1554 by 42.

15. A girl bought 6 packages of sugar. If she paid 90¢ for all, how much did she pay for a package?

16. A man had 120 sheep, and sold ¼ of the flock for $150. How much did he receive for each sheep?

17. A merchant's sales on Monday amounted to $56.25; Tuesday, $45.63; Wednesday, $67.50; Thursday, $65.87; Friday, $24.08, and Saturday, $75. Find the amount of sales for the week.

18. A newspaper has 9275 subscribers, 7090 of whom live in the city. How many live in the country?

1. Paid for labor, $104, for boards, $530, for timber, $243, and for hardware, $112. How much was paid for all?
2. Find the difference between 389 and 581.
3. Multiply 763 by 37.
4. Divide 98763 by 21.
5. Change ⅜ to 24ths.
6. Change 7⅜ to eighths.
7. Change ⁸⁴⁄₅ to a mixed number.
8. Add ⅚, ¾, and 1½.
9. From 4¼ take 1⅞.
10. Multiply 564 by 45.
11. In 2 yd. 2 ft. 2 in. how many inches?
12. Bought nuts for $2 a bushel, and sold them for 10 cents a quart. How much did I gain on 1 bushel? On 5 bushels?
13. If the top of your desk is 2 ft. long and 18 in. wide, how many yards is it round the desk? How many square feet are there in the top?
14. What is the area of the entire surface of a 4-foot cube?
15. What will 84 yd. of cloth cost at 75 cents a yard?
16. Express as common fractions: 10%, 25%, 33⅓%, 50%.
17. What % of 24 is 6? Is 12?
18. What per cent of 42 miles is 21 miles?
19. $6 is 20% of what number?
20. 40 rods is 25% of how many rods?
21. If ½ oz. of tea costs 5 cents, what will 1 oz. cost? 1 lb?
22. How many 4-inch squares can you get out of a square foot?
23. How many pints in five gallons?
24. How many pints in 2 gal. 3 qt.?
25. What is ⅛ of 64? ⅑ of 81? ₁⁄₁₀ of 110? ½ of 96?
26. ⅓ of 21, ¼ of 32, and ⅕ of 35, from 5 times 10 leaves how many?

1. $\frac{1}{3} - \frac{1}{4} = ?$ $\frac{1}{2} - \frac{1}{3} = ?$ $\frac{3}{4} - \frac{1}{8} = ?$
   $\frac{1}{4} - \frac{1}{8} = ?$ $\frac{1}{2} - \frac{1}{4} = ?$ $\frac{5}{8} - \frac{1}{2} = ?$
2. $\frac{1}{4} + \frac{1}{3} = ?$ $\frac{1}{2} + \frac{1}{3} = ?$ $\frac{1}{3} + \frac{1}{4} = ?$
   $\frac{1}{2} + \frac{1}{8} = ?$ $\frac{1}{3} + \frac{1}{8} = ?$ $\frac{1}{2} + \frac{1}{8} = ?$
3. Change: $\frac{1}{2}$ to 6ths. $\frac{1}{4}$ to 8ths. $\frac{1}{4}$ to 20ths.
   $\frac{1}{3}$ to 6ths. $\frac{1}{3}$ to 12ths. $\frac{1}{8}$ to 24ths.
4. Change to smallest terms:
   $\frac{2}{4}$, $\frac{4}{8}$, $\frac{3}{8}$, $\frac{4}{8}$, $\frac{6}{10}$, $\frac{8}{10}$, $\frac{3}{12}$, $\frac{4}{12}$, $\frac{5}{12}$, $\frac{9}{12}$, $\frac{10}{12}$, $\frac{6}{12}$, $\frac{3}{9}$, $\frac{6}{9}$, $\frac{8}{9}$, $\frac{12}{18}$, $\frac{8}{16}$.
5. Change to improper fractions:
   $2\frac{1}{2}$, $3\frac{3}{4}$, $4\frac{3}{5}$, $6\frac{5}{6}$, $4\frac{5}{8}$, $5\frac{3}{4}$, $7\frac{3}{8}$, $9\frac{5}{8}$, $7\frac{5}{8}$.
6. 4 is what part of 12?   What per cent of it?
7. What is $\frac{2}{3}$ of 12?
8. 8 is $\frac{2}{3}$ of what number?
9. Having \$15, I spent \$5.   What part of my money did I spend?   What per cent of my money did I not spend?
10. A day is what part of a week?
11. What part of a pound is 8 oz.?   What per cent is it?
12. What part of a bushel is 3 pk?   8 qt.?
13. 10 is $\frac{2}{3}$ of what number? $\frac{5}{6}$?
14. 12 is $\frac{3}{4}$ of what number? $\frac{4}{5}$?
15. 15 is $\frac{5}{6}$ of what number? $\frac{3}{8}$?
16. I had a jointed fishing rod in 3 parts.   One part was $2\frac{1}{2}$ ft. long, another $2\frac{3}{4}$, and another $3\frac{3}{4}$.   How long was the rod?
17. \$56 is $\frac{7}{8}$ of my money.   How much money have I?
18. In a school of 48 scholars $\frac{5}{8}$ are girls.   How many boys are there?
19. If $\frac{1}{2}$ lb. of coffee costs \$.15, what will 2 lb. cost?
20. How many quarter-dollars in \$4$\frac{3}{4}$?
21. There are 72 bananas in a bunch. $\frac{1}{3}$ of them were sold at one time, $\frac{1}{4}$ of them at another, $\frac{1}{8}$ at another.   How many remained?
22. 3 is $\frac{1}{8}$ of what number?

A *fraction* is one or more of the equal parts of a unit.

1. What is the expression ⅔ called?

2. Why is it called a fraction?

3. Into how many parts has the unit been divided?

4. In the expression, 2 books, what is the name of the thing mentioned?

5. In the expression ⅔, what is the name of the thing mentioned?

6. In the expression ⅔, the 3 tells us that a unit has been divided into thirds. We call the 3 the *denominator*, which means that which names.

7. In each of the following fractional expressions tell the denominator, and also tell what it shows us: ½, ⅔, ⅔, ⅛, ⅝, ⅞, ⅚, ⅜, ⅒, ⅟₉.

8. Of the fractional disks, find the one that illustrates thirds. Take two of these thirds. Write that as a fraction.

9. You have written ⅔. In this expression what does the 2 tell us?

10. The 2 counts or enumerates the number of parts that we have taken of the thirds. We call it the *numerator*, because it tells us the number of the parts of the unit that we are using.

11. In the following fractions name the numerators, and tell what they show us: ⅔, ₁₂ᵃ, ⅝, ⅜, 1½, ⅓, ⅞, ⅝, ₁₃ᵃ, 1⅜.

12. What is the *denominator*, and why so called?

13. What is the *numerator*, and why so called?

14. In the following fractions name both numerator and denominator: ₁₂ᵃ, ⅝, ₁₁ᵃ, ₁₂ᵃ, ₁₀ᵃ, ₁₃ᵃ, ⅞, ⅛, ⅔, ½.

15. A *proper fraction* is a fraction whose numerator is less than its denominator, as ½, ⅔.

16. An *improper fraction* is a fraction whose numerator is equal to or greater than its denominator, as ⅘, ⅝.

17. A mixed number consists of a whole number and a fraction, as 2½, 4⅔.

(Review pages 23, 24.)

1. Add $4\frac{1}{2}$ When possible lead 2. Add $3\frac{1}{2} = 3\frac{3}{6}$ Can we add
  $2\frac{5}{8}$ the pupils to connect $4\frac{1}{6} = 4\frac{1}{6}$ $\frac{1}{2}$, $\frac{1}{6}$ and $\frac{2}{3}$?
  $9\frac{3}{4}$ the fractions which $2\frac{2}{3} = 2\frac{4}{6}$ What change
  $4\frac{1}{2}$ united form wholes. $9\frac{8}{6} = 10\frac{1}{3}$ must we first
  $\overline{19}$ See illustration.   make?
  2
  $\overline{21}$ To what can we change these frac-
            tions so that they will be alike?
            $\frac{1}{2}$ equals how many sixths?
            $\frac{2}{3}$ equals how many sixths?

NOTE. — If the pupils do not seem to understand this change, let them continue to illustrate as on pages 22 and 23, or use fractional disks.

Add:

	3.	4.	5.	6.	7.
	$5\frac{1}{3}$	$7\frac{1}{2}$	$7\frac{3}{8}$	$4\frac{3}{4}$	$9\frac{5}{8}$
	$4\frac{1}{4}$	$4\frac{2}{3}$	$2\frac{1}{2}$	$2\frac{5}{8}$	$4\frac{1}{3}$
	$6\frac{2}{3}$	$8\frac{1}{6}$	$4\frac{4}{8}$	$6\frac{1}{2}$	$6\frac{2}{3}$
	$3\frac{1}{2}$	$3\frac{1}{2}$	$6\frac{1}{8}$	$8\frac{1}{4}$	$8\frac{1}{6}$

8. Subtract:

$6\frac{1}{2} = 6\frac{3}{6}$ Why did we change $\frac{1}{2}$ to $\frac{3}{6}$? Prove by the
$2\frac{2}{3} = 2\frac{4}{6}$ fractional disks that $\frac{1}{2}$ is equal to $\frac{3}{6}$.
$\overline{4\frac{5}{6}}$

Subtract:

	9.	10.	11.	12.	13.
	$6\frac{1}{2}$	$9\frac{2}{3}$	$12\frac{5}{6}$	$11\frac{7}{1}$	$18\frac{2}{3}$
	$4\frac{1}{3}$	$4\frac{1}{2}$	$8\frac{2}{3}$	$4\frac{3}{4}$	$11\frac{1}{6}$

14. Learn: To add or subtract fractions, change the fractions to equivalent fractions having a common denominator. Add or subtract the numerators for a new numerator, and place it over the common denominator.

Add:

	15.	16.	17.	18.	19.
	$7\frac{1}{9}$	$6\frac{7}{10}$	$8\frac{1}{3}$	$7\frac{3}{8}$	$7\frac{1}{4}$
	$4\frac{2}{3}$	$4\frac{3}{8}$	$11\frac{1}{2}$	$8\frac{2}{3}$	$3\frac{4}{8}$
	$5\frac{1}{3}$	$3\frac{1}{2}$	$7\frac{5}{6}$	$6\frac{5}{8}$	$9\frac{1}{12}$

Add:

1.	2.	3.	4.	5.
$3\frac{1}{2}$	$4\frac{1}{3}$	$4\frac{1}{4}$	$6\frac{1}{2}$	$2\frac{1}{3}$
$2\frac{1}{2}$	$2\frac{1}{3}$	$2\frac{3}{4}$	$7\frac{1}{4}$	$6\frac{3}{4}$
$4\frac{1}{2}$	$3\frac{1}{3}$	$3\frac{1}{4}$	$1\frac{1}{4}$	$4\frac{1}{2}$

Subtract:

6.	7.	8.	9.	10.
$4\frac{1}{2}$	$8\frac{3}{4}$	$6\frac{2}{3}$	10	$12\frac{1}{3}$
$2\frac{1}{4}$	$5\frac{1}{2}$	$2\frac{1}{3}$	$7\frac{1}{2}$	6

Add:

11.	12.	13.	14.	15.
$2\frac{1}{2}$	$3\frac{1}{3}$	$1\frac{1}{4}$	$1\frac{1}{8}$	$6\frac{1}{8}$
$3\frac{1}{4}$	$4\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$
$2\frac{1}{2}$	$2\frac{2}{3}$	$3\frac{1}{3}$	$3\frac{1}{8}$	$2\frac{1}{2}$
$3\frac{3}{4}$	$3\frac{1}{2}$	$4\frac{2}{3}$	$2\frac{3}{8}$	$3\frac{1}{8}$

Subtract:

16.	17.	18.	19.	20.
9	8	$9\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{2}{3}$
$6\frac{1}{4}$	$4\frac{3}{4}$	$4\frac{1}{4}$	$6\frac{1}{4}$	$4\frac{1}{3}$

Give results:

21.	22.	23.	24.
$2\frac{1}{2} + \frac{1}{2}$	$1\frac{1}{4} + 1\frac{1}{4}$	$2\frac{1}{3} + 2\frac{1}{3}$	$1\frac{1}{4} + 2\frac{1}{4}$
$1\frac{1}{2} + 1\frac{1}{2}$	$2\frac{1}{4} + 2\frac{3}{4}$	$1\frac{1}{3} + 1\frac{2}{3}$	$6\frac{1}{4} + 1\frac{1}{4}$
$2\frac{1}{2} + 3\frac{1}{2}$	$1\frac{1}{4} + 1\frac{1}{2}$	$1\frac{2}{3} + 2\frac{1}{3}$	$4\frac{1}{3} + 2\frac{1}{4}$

Give results:

25.	26.	27.	28.
$3\frac{1}{3} - 2\frac{1}{3}$	$4\frac{1}{2} - 1\frac{1}{2}$	$6\frac{3}{4} - 2\frac{1}{4}$	$2\frac{2}{3} - 1\frac{1}{8}$
$4\frac{2}{3} - 1\frac{1}{3}$	$3\frac{1}{2} - 2$	$2\frac{1}{4} - 1\frac{1}{4}$	$2\frac{3}{4} - 1\frac{1}{2}$
$6 - 2\frac{1}{3}$	$3 - 1\frac{1}{2}$	$3\frac{3}{4} - 1\frac{1}{2}$	$2\frac{5}{6} - 1\frac{1}{2}$

1. If I asked you to multiply 2 books by 4, would you try to multiply the name books, or would you multiply the 2, which tells the number of books?

2. If I should ask you to multiply 2 thirds by 4, should you multiply the name thirds? What would you do?

3. 4 times 2 books = 8 books.

  4 times 2 thirds = 8 thirds.

4. Multiply $\frac{3}{4}$ by 4. 4 times 3 fourths are 12 fourths, which equal 3 units.

5. Multiply: $\frac{5}{8}$ by 3. $\frac{5}{8}$ by 4. $\frac{5}{12}$ by 6. $\frac{5}{8}$ by 4.

  $\frac{2}{3}$ by 9. $\frac{3}{14}$ by 7. $\frac{8}{15}$ by 5. $\frac{7}{8}$ by 4.

6. Multiply: $\frac{5}{18}$ by 9. $\frac{3}{25}$ by 5. $\frac{11}{12}$ by 12. $\frac{3}{4}$ by 6.

  $\frac{7}{8}$ by 12. $\frac{2}{3}$ by 4. $\frac{1}{14}$ by 7. $\frac{9}{11}$ by 22.

7. Multiply: $\frac{1}{3}$ by 3. $\frac{1}{8}$ by 6. $\frac{1}{12}$ by 9. $\frac{1}{4}$ by 10.

  $\frac{3}{7}$ by 5. $\frac{5}{8}$ by 3. $\frac{3}{12}$ by 6. $\frac{1}{2}$ by 8.

8. Learn: Multiply the numerator of the fraction by the integer, and when possible change the product to an integer or mixed number.

2 $\frac{1}{2} \times 6 = \frac{6}{2} = 3$.   NOTE. — Do not change mixed numbers to frac-

6   tional forms in the following examples. 6 times 2

$\overline{12}$ units are 12 units. 6 times $\frac{1}{2}$ are $\frac{6}{2}$, which are 3 units.

3   12 units and 3 units are 15 units.

$\overline{15}$

9. Multiply: $2\frac{1}{2}$ by 6. $8\frac{1}{3}$ by 6. $9\frac{1}{2}$ by 4. $4\frac{1}{3}$ by 9.

  $4\frac{3}{12}$ by 8. $4\frac{2}{3}$ by 5. $7\frac{3}{12}$ by 8. $2\frac{2}{3}$ by 5.

10. Multiply: $8\frac{3}{5}$ by 5. $3\frac{1}{4}$ by 8. $4\frac{1}{3}$ by 9. $5\frac{1}{4}$ by 8.

  $8\frac{2}{3}$ by 9. $6\frac{3}{4}$ by 8. $4\frac{3}{8}$ by 10. $3\frac{4}{5}$ by 14.

11. Multiply: $6\frac{3}{4}$ by 9. $4\frac{5}{8}$ by 9. $15\frac{1}{3}$ by 9. $5\frac{3}{8}$ by 12.

  $8\frac{1}{3}$ by 9. $7\frac{1}{3}$ by 6. $24\frac{1}{4}$ by 8. $8\frac{5}{8}$ by 16.

12. Multiply: $3\frac{3}{4}$ by 5. $7\frac{4}{5}$ by 5. $8\frac{1}{4}$ by 12. $8\frac{1}{2}$ by 14.

  $4\frac{1}{2}$ by 8. $9\frac{3}{4}$ by 8. $6\frac{5}{8}$ by 8. $4\frac{7}{8}$ by 18.

13. Multiply: $7\frac{4}{5}$ by 9. $8\frac{3}{8}$ by 3. $8\frac{5}{6}$ by 12. $4\frac{5}{9}$ by 14.

  $12\frac{5}{8}$ by 3. $8\frac{5}{7}$ by 7. $12\frac{3}{4}$ by 16. $9\frac{1}{2}$ by 12.

To find the fractional part of an integer, or to multiply an integer by a fraction.

Multiply 6 by $\frac{2}{3}$. This example means find $\frac{2}{3}$ of 6. What
$\frac{1}{3}$ of 6 = 2.   is $\frac{1}{3}$ of 6? If $\frac{1}{3}$ equals 2, what will $\frac{2}{3}$
$\frac{2}{3} = 2 \times 2 = 4.$ equal?

Multiply:

1. 12 by $\frac{3}{4}$.   42 by $\frac{5}{6}$.   72 by $\frac{7}{12}$.   63 by $\frac{5}{6}$.
    8 by $\frac{3}{4}$.   16 by $\frac{5}{8}$.   40 by $\frac{5}{8}$.   60 by $\frac{7}{12}$.
    9 by $\frac{2}{3}$.   60 by $\frac{3}{10}$.   24 by $\frac{5}{8}$.   28 by $\frac{3}{7}$.

2. 16 by $\frac{3}{4}$.   42 by $\frac{5}{6}$.   63 by $\frac{5}{8}$.   32 by $\frac{7}{8}$.
   50 by $\frac{4}{5}$. .   56 by $\frac{3}{7}$.   84 by $\frac{7}{12}$.   45 by $\frac{2}{3}$.
   42 by $\frac{5}{6}$.   56 by $\frac{7}{8}$.   99 by $\frac{7}{11}$.   36 by $\frac{5}{8}$.

3. 54 by $\frac{7}{9}$.   64 by $\frac{5}{8}$.   63 by $\frac{7}{9}$.   49 by $\frac{5}{7}$.
   66 by $\frac{5}{11}$.   42 by $\frac{6}{7}$.   56 by $\frac{5}{8}$.   33 by $\frac{2}{11}$.
   72 by $\frac{5}{9}$.   84 by $\frac{7}{12}$.   90 by $\frac{7}{10}$.   42 by $\frac{5}{6}$.

4. 77 by $\frac{5}{7}$.   45 by $\frac{5}{8}$.   64 by $\frac{7}{8}$.   35 by $\frac{4}{5}$.
   25 by $\frac{2}{3}$.   80 by $\frac{9}{10}$.   96 by $\frac{5}{12}$.   45 by $\frac{2}{3}$.
   16 by $\frac{5}{8}$.   27 by $\frac{4}{5}$.   35 by $\frac{2}{3}$.   72 by $\frac{7}{9}$.

5. $\frac{3}{4}$ by 4. $\frac{1}{14}$ by 7. $\frac{7}{9}$ by 6. $\frac{3}{10}$ by 5.
    $\frac{3}{4}$ by 8. $\frac{5}{6}$ by 6. $\frac{1}{2}$ by 12. $\frac{5}{6}$ by 3.
    $\frac{3}{10}$ by 5. $\frac{7}{12}$ by 6. $\frac{3}{4}$ by 12. $\frac{5}{8}$ by 8.
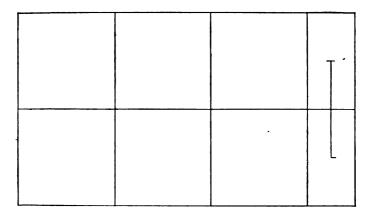
NOTE. — See note on page 52.

6. 4 by $8\frac{1}{2}$.   8 by $3\frac{1}{4}$.   6 by $4\frac{1}{2}$.   8 by $2\frac{1}{4}$.
    4 by $7\frac{1}{4}$.   5 by $8\frac{3}{4}$.   12 by $9\frac{3}{4}$.   9 by $3\frac{2}{3}$.
    8 by $12\frac{5}{8}$ 10 by $8\frac{1}{2}$.   8 by $5\frac{3}{4}$.   9 by $14\frac{2}{3}$.

7. 12 by $6\frac{1}{4}$.   18 by $4\frac{1}{2}$.   10 by $6\frac{4}{5}$.   18 by $5\frac{2}{3}$.
   16 by $7\frac{3}{4}$.   12 by $8\frac{5}{6}$.   12 by $3\frac{2}{3}$.   15 by $6\frac{2}{3}$.
   12 by $15\frac{5}{6}$.   24 by $15\frac{3}{4}$.   16 by $18\frac{2}{3}$.   20 by $18\frac{7}{10}$.

1. Multiply:

$\frac{2}{3}$ by 3	$\frac{3}{5}$ by 10	$\frac{2}{14}$ by 7	$6\frac{1}{2}$ by 4
$\frac{3}{4}$ by 8	$\frac{7}{8}$ by 9	$\frac{3}{15}$ by 5	$4\frac{2}{3}$ by 6
$\frac{7}{8}$ by 4	$\frac{4}{7}$ by 7	$\frac{3}{8}$ by 4	$4\frac{1}{8}$ by 3

2. Multiply:

18 by $\frac{2}{3}$	18 by $\frac{5}{8}$	21 by $\frac{4}{7}$	10 by $\frac{2}{5}$
30 by $\frac{2}{3}$	15 by $\frac{2}{3}$	24 by $\frac{2}{3}$	9 by $\frac{1}{3}$
12 by $\frac{5}{8}$	24 by $\frac{3}{4}$	40 by $\frac{3}{8}$	14 by $\frac{4}{7}$

3. Subtract:

$\frac{1}{2} - \frac{1}{4}$	$\frac{3}{4} - \frac{2}{3}$	$\frac{7}{8} - \frac{1}{3}$	$\frac{1}{3} - \frac{1}{6}$
$\frac{2}{3} - \frac{1}{2}$	$\frac{1}{2} - \frac{1}{4}$	$\frac{3}{10} - \frac{1}{8}$	$\frac{1}{2} - \frac{1}{8}$
$\frac{3}{8} - \frac{1}{2}$	$\frac{3}{4} - \frac{1}{2}$	$\frac{2}{7} - \frac{1}{14}$	$\frac{1}{4} - \frac{1}{8}$

4. Add:

$\frac{1}{2} + \frac{1}{4}$	$\frac{3}{4} + \frac{1}{2}$	$\frac{1}{3} + \frac{3}{8}$	$\frac{2}{3} + \frac{1}{3}$
$\frac{1}{3} + \frac{1}{4}$	$\frac{7}{8} + \frac{1}{3}$	$\frac{1}{2} + \frac{3}{4}$	$\frac{5}{8} + \frac{1}{2}$
$\frac{1}{4} + \frac{1}{8}$	$\frac{3}{10} + \frac{1}{8}$	$\frac{2}{3} + \frac{1}{8}$	$\frac{3}{4} + \frac{1}{2}$

5. Multiply:

$\frac{2}{3}$ by 5	$\frac{4}{7}$ by 7	$\frac{3}{4}$ by 12	$\frac{2}{3}$ by 9
$\frac{3}{4}$ by 5	$\frac{5}{8}$ by 3	$\frac{3}{4}$ by 4	$\frac{5}{8}$ by 12
$\frac{3}{15}$ by 5	$\frac{1}{2}$ by 12	$\frac{2}{3}$ by 12	$\frac{3}{10}$ by 20

6. Multiply:

9 by $\frac{2}{3}$	15 by $\frac{2}{3}$	22 by $\frac{2}{11}$	10 by $\frac{4}{5}$
7 by $\frac{1}{14}$	20 by $\frac{7}{10}$	18 by $\frac{7}{8}$	27 by $\frac{1}{3}$
12 by $\frac{2}{3}$	14 by $\frac{1}{2}$	16 by $\frac{7}{8}$	24 by $\frac{1}{8}$

7. Add:

$2\frac{1}{2} + 1\frac{1}{4}$	$3\frac{1}{8} + 2\frac{1}{4}$	$1\frac{1}{3} + 2\frac{1}{3}$	$1\frac{1}{14} + 1\frac{4}{7}$
$1\frac{1}{3} + 1\frac{1}{2}$	$1\frac{1}{8} + 1\frac{1}{2}$	$2\frac{3}{10} + 2\frac{1}{8}$	$2\frac{1}{15} + 2\frac{1}{3}$
$2\frac{1}{8} + 1\frac{1}{2}$	$2\frac{5}{8} + 1\frac{1}{3}$	$1\frac{7}{10} + 2\frac{1}{2}$	$1\frac{1}{15} + 3\frac{1}{8}$

Application of pages 52 and 53.5.

1. At ⅔ of a cent each, what will 15 apples cost?

2. At $¾ a pound, what will 12 lb. of nutmegs cost?

3. At $⅝ a basket, what is the cost of 16 baskets of peaches?

4. At 6¼¢ each, what will 8 pencils cost?

5. What is the cost of 8 doz. eggs at 12½¢ a dozen?

6. If a man can walk 30 miles in a day, how far can he walk in ⅝ of a day?

7. What will 4¼ yd. of edging cost at 12¢ a yard?

8. What is the cost of 9¼ lb. of cheese at 12¢ a pound?

9. What is the cost of 8½ qt. of cherries at 12¢ a quart?

10. What will 15½ doz. eggs cost at 20¢ a dozen?

11. A lady bought 12 yd. of muslin at 8½¢ a yard.

12. How much must I pay for 20 melons at 15½¢ each?

13. If a man earns $9¾ a week, how much will he earn in 8 weeks?

14. What will 12 bbl. of vinegar cost at $4¾ a barrel?

15. If a horse eats 2½ bu. of grain in a week, how many bushels will he eat in 16 weeks?

16. If a man travels 8½ miles an hour, how far will he travel in 12 hours?

17. What will 8 cords of wood cost at $5½ a cord?

18. What is the cost of 8 hats at $5¾ each?

19. If a basket of peaches is worth 75 cents, what is ⅔ of a basket worth?

20. Find the cost of 16 yd. of cloth at $¾ a yard.

21. Find the area of a floor 12 ft. long and 8¾ ft. wide.

22. Find the cost of 20 yd. of cloth at $⅜ a yard.

23. Find the cost of 16 yd. of cloth at $2½ a yard.

24. What is the cost of 24 cd. of wood at $5¾ a cord?

25. What will 64 doz. eggs cost at 28½¢ a dozen?

26. What will 40 cows cost at an average of $28¾ a head?

27. What is the cost of 18 stoves at $33½ each?

How many square inches in a rectangle 3½ in. long and 2 in. wide? ˙ *See illustration.*

Make drawings, and find the area of each of the following rectangles:

1. A rectangle 3 in. long by 2½ in. wide.
2. A rectangle 4½ in. long by 2 in. wide.
3. A rectangle 4½ in. long by 3 in. wide.
4. A rectangle 4 in. long by 2½ in. wide.
5. A rectangle 4 in. long by 3½ in. wide.
6. A rectangle 5½ in. long by 2 in. wide.
7. A rectangle 5½ in. long by 3 in. wide.
8. A rectangle 5½ in. long by 4 in. wide.
9. A rectangle 5 in. long by 4½ in. wide.
10. A rectangle 5 in. long by 3½ in. wide.
11. A rectangle 5 in. long by 2½ in. wide.
12. A rectangle 6 in. long by 2½ in. wide.
13. A rectangle 6 in. long by 3½ in. wide.
14. A rectangle 6 in. long by 4½ in. wide.
15. A rectangle 6 in. long by 5½ in. wide.

1. How many feet in 12 yards? In 144 inches?

2. What is $\frac{1}{5}$ of 60 books? Of $96? Of 72 cows?

3. Find the price of $\frac{1}{3}$ of 36 acres at $11 an acre.

4. Arthur is 12 years old, and Perry is $33\frac{1}{3}\%$ as old. How old is he?

5. How many cords are $\frac{3}{11}$ of 121 cords? What will they cost at $5 a cord?

6. How many dollars are $\frac{1}{11}$ of $99? If you divide them among three persons, how many dollars will each receive?

7. 55 equals how many 11's?

8. $\frac{1}{11}$ of 33 equals what?

9. At $10 a head, what will 11 cows cost?

10. 10 cents is what part of a dollar? What % of it?

11. 20 cents is what part of a dollar? What % of it?

12. 50 cents is what part of a dollar? What % of it?

13. What is $\frac{1}{3}$ of 36? 18? 72? 99? 81?

14. What is $\frac{1}{7}$ of 35? $\frac{2}{7}$? $\frac{3}{7}$? $\frac{4}{7}$? $\frac{5}{7}$? $\frac{6}{7}$? $\frac{7}{7}$?

15. A farmer had 12 bushels of oats, and 9 times as many bushels of corn. How many bushels of grain had he?

16. At 8¢ a peck, how much will 2 bushels of oats cost?

17. What is 1 qt. of beans worth, if a peck is worth 64 cents?

18. 63 are how many 9's?

19. 8 is what part of 72?

20. How many pecks in 32 qt.? 72 qt.? 56 qt.?

21. If a person walks 8 hours a day, how many hours will he walk in 6 days?

22. At $12 a month, how much rent must a man pay in a year?

23. How many cubic inches are there in a box 6 in. long, 4 in. wide, and 2 in. deep?

24. $\frac{3}{4}$ of an hour are how many minutes?

25. 9 weeks are how many days?

26. If a boy has $4\frac{1}{2}$ doz. eggs, how many will he have left after selling 30 eggs?
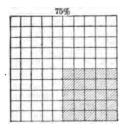
1. Copy and learn:

> 12 inches make 1 foot.
>
> 3 feet make 1 yard.
>
> 5½ yards make 1 rod.
>
> 16½ feet make 1 rod.

2. Take the yard-stick, and see how many yards it is round the schoolroom.

3. Take a string 16½ ft. long, and see how many rods it is round the schoolroom.

4. How many yards in 6 feet?

5. How many feet in 24 inches?

6. How many feet in 36 inches?

7. How many inches in 1 yd.?

8. How many rods in 11 yards?

9. How many feet in 4 rods?

10. Which is longer, 5½ yards or 16½ feet?

11. Which is longer, 5 yards or 15 feet?

12. How many yards in 2 rods?

13. How many inches in ½ yd.?

14. Name two objects in the room 1 rod apart.

15. It is 4 rods from my house to my barn; how many feet long is a wire that reaches from one to the other?

16. How many inches in 9 feet?

17. How many feet in 25 yards?

18. How many yards in 8 rods?

19. How many inches in ¼ yard?

20. How many yards in 2 rd. 3 yd.?

21. If a yard of ribbon should be cut into 6-inch pieces, how many pieces would there be?

22. Take your string that is a rod long and see how many pieces 6 inches long can be cut from it.

1. A man owed $1725; he paid $150 at one time, $275 at another, and $390 at another. How much does he still owe?

2. Bought some flour for $60, a ham for $3, and a box of starch for $2. What change should I receive for a $100 bill?

3. If 5 men divide 640 acres of land equally, how many acres does each man get, and how much is each man's share worth at $75 an acre?

4. What is the sum of $\frac{2}{3}$ and $\frac{4}{5}$?

5. If I had $\frac{1}{6}$ of a yard of ribbon, and have used $\frac{1}{2}$ of a yard, what part of a yard have I left?

6. Sold goods for $20, and thus gained $5. What did the goods cost? What per cent was gained?

7. John has $300.25, and William $175.15. How much more has John than William? How many dollars have both of them?

8. What will 75 bbl. of flour cost at $6.25 a barrel?

9. What will a peck of chestnuts cost at $12\frac{1}{2}$¢ a quart?

10. How many gallons in 512 pints of oil? What will it cost at 30¢ a gallon?

11. Reduce 180 bushels to quarts?

12. What is $33\frac{1}{3}$% of 1200 sheep?

13. A man sold a horse for $200 that had cost him $150. How many dollars did he gain? What per cent did he gain?

14. What is the wall surface in a room whose sides are 12 ft. in length, 10 ft. in width, and 9 ft. in height?

15. Add:

$1\frac{3}{4}$	$2\frac{1}{4}$	$3\frac{1}{3}$	$2\frac{1}{4}$	$1\frac{1}{2}$
$2\frac{1}{2}$	$1\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{3}{8}$	$6\frac{2}{3}$
$3\frac{2}{3}$	$4\frac{1}{2}$	$2\frac{4}{5}$	$7\frac{3}{4}$	$4\frac{1}{4}$

16. Multiply $10.60 by 100.

17. Multiply $1.05 by 25.

18. $5\frac{1}{2}$ lb. $+ 7\frac{1}{2}$ lb. $- 8\frac{1}{4}$ lb. $+ 9\frac{1}{2}$ lb. $- 11\frac{1}{2}$ lb. are how many pounds?

1. If 8 lb. of meat cost 48 cents, what will 10 lb. of meat cost?

2. How much must be paid for 12 books at the rate of 5 books for 50 cents?

3. If ⅓ of the price of a cow is $5, what is the whole price of the cow?

4. What is the value of 9 bu. of potatoes at the rate of ⅓ of a bushel for 20 cents?

5. If ¾ of a pound of starch costs 9 cents, what will 1 pound cost?

6. How much will 6 bushels of apples cost, if ⅓ of a bushel costs 10 cents?

7. 9 is ⅓ of what number?   10 is ¼ of what number?

8. 40 is ⅓ of what number?   50 is ⅝ of what number?

9. A man sold a cow for $24, which was ⅔ of what he paid for her.   What did she cost?   What did he lose?

10. What are ⅚ of 42?   63?   49?   84?

11. A watch cost $10 more than ⅝ of $40.   What was its cost?

12. Mary has ⅓ of 30 roses, and Sarah ½ of 20 roses.   How many roses have they both?

13. What are ⅔ of 9?   12?   15?   18?

14. What are ⅜ of 24?   21?   30?   36?

15. How many inches in 9 feet and 6 inches?

16. How many feet in the length of each side of a square yard?   How many square feet in a square yard?

17. How many gills in 6 pints? 8 pints? 3 quarts? 1 gallon?

18. How many pints in 5 quarts? 9 quarts? 1 peck? 1 bushel?

19. How many quarts in 3 pecks?   7 pecks?   3 bushels? 24 pints?

20. 3 and 6 are what parts of 12?

21. 7 and 3 are what parts of 21?
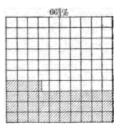
22. What is the relation of 7 to 42?

Fig. 1.   Fig. 2.

1. How many little squares in Fig. 1 ?

2. How many little squares in the part not crossed off ?

3. We call this 75% of the square. Can you tell why ?

4. What part of the whole square is 75% of it ?

5. 75% is how many times 25% ?

6. Draw a line 12 in. long. Cross off 75% of it. What per cent have you not crossed off ?

7. Copy and learn : 75% of an article is ¾ of it.

8. Find 75% of 16 apples. Find 75% of $20.

9. Find 75% of 36 oranges. Of 24 horses.

10. In Fig. 2 how many parts are not crossed off ? What per cent, then, is not crossed off ?

11. What part is crossed off ? What part is not crossed off ?

12. What part of anything, then, is 66⅔% of it ?

13. How much larger is 66⅔% of an apple than 33⅓% of it ?

14. Find 66⅔% of 9. Of 27. Of 36.

15. Draw 2 squares on the board each 12 in. Cross off 75% of one of them and 66⅔% of the other.

16. Draw 2 circles. Cross off from one of them 75% of it. Cross off from the other 66⅔% of it.

17. Which is larger, 75% of 28 or 66⅔% of 30 ? How much larger?

1. There are 186 acres in a certain lot. How many acres would you buy if you bought $33\frac{1}{3}\%$ of the lot?

2. If a pile of wood costs $70, what will 20% of the pile cost?

3. A man bought a horse for $240 and sold it so as to gain 25%. How much did he gain?

4. A man bought a watch for $64, but paid for only 25% of it. How much did he pay?

5. Find 20% of $500. 10% of $100.

6. My barn cost $500. I owe for 20% of it. How much do I owe?

7. What is 25% of a gallon? $33\frac{1}{3}\%$ of a yard? 50% of a quart? 50% of a peck?

8. How much does 25% of an acre of land cost at $144 an acre?

9. How much will 50% of a gallon of vinegar cost, if 1 quart costs 6 cents?

10. A man had 400 hens and sold 75% of them. How many did he sell? How many did he have left?

11. A man had 300 bu. of corn and sent $66\frac{2}{3}\%$ of it to the mill. How many bushels did he send to the mill?

12. If I should offer you your choice between 75% of 120 marbles and $66\frac{2}{3}\%$ of 120 marbles, which would you choose? Find out if you have chosen the larger number.

13. In a school of 336 pupils, $66\frac{2}{3}\%$ were girls. How many girls were there? How many boys were there?

14. It is 90 miles from New York to Philadelphia. After travelling $66\frac{2}{3}\%$ of the distance, how far have you then to travel?

15. If a horse costs $120, for what ought I to sell it to gain 20%?

16. I bought a farm for $1600 and in selling it I lost 25%. How much did I lose?

1. What part of a number is 25% of it?
2. What part of a number is 20% of it?
3. What part of a number is 10% of it?
4. What part of a number is 12½% of it?
5. What part of a number is 33⅓% of it?
6. What part of a number is 100% of it?
7. What is 10% of 120?
8. What is 50% of 140?
9. What is 25% of 80?
10. What per cent of 9 is 3? Of 12 is 4?
11. What per cent of a number is ½ of it?
12. What per cent of a number is ¾ of it?
13. What per cent of a number is ⅔ of it?
14. What per cent of a number is ⅓ of it?
15. What per cent of a gallon is 2 quarts?
16. What per cent of a quart is 4 gills?
17. What per cent of a day is 12 hr.? 8 hr.? 6 hr.?
18. What per cent of a bushel is 16 qt.? 8 qt.?
19. What per cent of a yard is 2 ft.? 1 ft.? 1½ ft.?
20. What per cent of a foot is 6 in.? 4 in.? 3 in.?
21. A man paid $50 for a cow, and sold it at a loss of 10%. How much did he lose?
22. 40 is 25% of what number?
23. 25 is 33⅓% of what number?
24. I bought a book case for $15, and sold it for $18. What per cent did I gain?
25. A man bought bananas at 20 cents a dozen, and sold them so as to gain 25%. What did he receive for a dozen?
26. What is the number of children in your room if 5 is 10% of the whole number?
27. 50 pupils belonged in a school. One stormy day 10 were absent. What per cent were absent?

_____ a _____   1. Measure these two lines.
_____ b _____ How do their lengths compare?

2. How many times larger is a 2-inch line than a 1-inch line? What is the relation then of a 2-inch line to a 1-inch line?

a ——
b ———   3. How does a compare
c ————   in length with b? What
d —————   is the relation of b to a?
e ——————
f ———————   4. In the same way com-

pare a with each of the other lines and each of the, other lines with a.

5. Compare the area of each figure with each of the other figures.

6. *Ratio* means relation. The comparison of one object or quantity with another object or quantity of the same kind is called ratio.

7. Ratio is found by dividing the first number by the second.

8. What is the ratio of 12 to 4? Of 50 to 10?

9. Draw a line 2 inches long. How long will another line be if its ratio to the first line is 4? 6? ¼? ½?

10. Three is the ratio of 6 to what? One half is the ratio of 6 to what?

1. What is the ratio of :

36 to 12?	12 to 4?	1 foot to 6 inches?
49 to 7?	5 to 10?	1 quart to 1 pint?
72 to 8?	8 to 4?	1 gallon to 1 quart?
42 to 6?	3 to 6?	1 yard to 1 foot?

2. What is the ratio of :

A 4-in. square to a 2-in. square?	1 da. to 2 hr. ?
A 6-in. square to a 2-in. square?	1 yr. to 4 mo. ?
A 2-in. cube to a 1-in. cube?	2 wk. to 2 da.?
A bushel to a peck?	1 min. to 30 sec. ?

3. If 9 sheep cost $72, what will three sheep cost at the same rate ?

NOTE. — Train the pupils to perform such problems by using ratio. Three sheep are ⅓ of 9 sheep, hence they will cost ⅓ of $72, or $24. Do not find the cost of one.

4. If 15 bbl. of oil cost $225, what will 45 bbl. cost at the same rate ?

5. If 16 cows cost $352, what will 32 cows cost?

6. If 8 apples cost 48 cents, what will 5 apples cost?

NOTE. — What is the ratio of 5 apples to 8 apples ? Find ⅝ of 48 cents.

7. If 12 cords of wood cost $60, what will 4 cords cost ?

8. If 7 pounds of sugar cost 56 cents, what will 14 pounds cost?

9. If a man earns $48 in 4 months, how much will he earn in 9 months ?

10. If a man earns $72 in 8 months, how many dollars will he earn in 12 months ?

11. If 9 cords of wood are worth $42.75, how much are 27 cords worth ?

12. If 20 bu. of apples are worth $16, how much are 15 bu. worth ?

NOTE. — 15 is what part of 20 ?

1. I spent ½ of a dollar for a ball, and ¹⁄₁₀ of a dollar for a bat. What part of a dollar did I spend for both?

2. If I sell ⅓ of a dozen oranges to one person, and ¼ of a dozen to another person, what part of a dozen do I sell? How many oranges do I sell?

3. 18 hours is what part of a day? What per cent of a day?

4. $78 - 7 - 9 - 6 - 4 - 10 - 3 - 4 = ?$

5. $15 + 9 + 6 + 10 + 8 + 3 + 7 + 8 = ?$

6. How many inches are there in 1 yard? In 2 yards?

7. If 8 apples cost 32 cents, what must I pay for 11 apples?

8. To find the cost of articles at 25¢ a lb., yd., etc. At 25¢ each, 4 articles will cost $1, hence the given number of articles will cost ¼ as many dollars as there are articles.

At a uniform price of 25¢ find the cost of:

32 balls.	56 vases.	60 bars of soap.
52 lb. of coffee.	48 straw hats.	44 bu. of tomatoes.
36 books.	84 yd. of ribbon.	40 yd. of cloth.

9. Since 50¢ is ½ of a dollar, a number of articles at 50¢ each will cost ½ as many dollars as there are articles.

At 50¢ each find the cost of:

44 lb. of tea.	59 books.	30 capes.
48 penknives.	68 pairs of scissors.	56 boxes of pens.
64 lb. of candy.	64 readers.	33 dolls.
76 grammars.	36 lamps.	48 chairs.

10. How many 9's in 3 times 21?

11. A half-dollar and a quarter-dollar equal —— cents?

12. What is the relation of 12 to 4? Of 15 to 5? Of 16 to 8? Of 18 to 6?

13. If 6 combs cost 9 cents, what will 12 combs cost?

14. Frank lost 12 marbles, which is ⅔ of what he had at first. How many had he at first?

15. 10 is ⅔ of what number?

Change:

1. 7 lb. 5 oz. to ounces.
2. 14 gal. 3 qt. to quarts.
3. 28 qt. 1 pt. to pints.
4. 18 bu. 3 pk. to pecks.
5. 17 pk. 7 qt. to quarts.
6. 49 bu. to quarts.
7. 5 yd. to inches.
8. 14 yd. 2 ft. to feet.
9. 13 ft. 3 in. to inches.
10. 70 ft. to yards and feet.
11. 24 lb. 12 oz. to ounces.
12. 19 lb. 4 oz. to ounces.
13. 63 gal. 3 qt. to quarts.
14. 24 gal. 1 qt. to quarts.
15. 98 ft. to inches.
16. 75 bu. to quarts.
17. 33 yd. to inches.
18. 135 gal. to pints.
19. 19 ft. 11 in. to inches.
20. 18 bu. 3 pk. to pecks.
21. 7 qt. 1 pt. to pints.
22. 4 gal. 1 pt. to pints.
23. 69 oz. to pounds and ounces.
24. 82 qt. to gallons and quarts.
25. 47 pt. to quarts and pints.
26. 97 qt. to pecks and quarts.
27. 87 pk. to bushels and pecks.
28. 119 in. to feet and inches.
29. How many quarts in 40 pints?
30. How many bushels in 40 pecks?
31. 64 quarts equals —— pecks?
32. If 16 pints of milk cost 64 cents, what does 1 gallon cost?
33. I bought 30 pecks of apples at 30¢ a peck, and sold them at 35¢ a peck. How much did I gain?
34. I bought 15 bu. of apples at $1.00 a bushel, and sold them at 30¢ a peck. How much did I gain?
35. What will 6 gal. 3 qt. of vinegar cost at 7¢ a quart?
36. What is the price of apples a bushel when they are selling at 12¢ a half-peck?
37. If a pound of coffee costs 38 cents, what will $4\frac{1}{2}$ pounds cost?
38. At 80¢ a pound, what will $\frac{1}{4}$ of a pound of tea cost?

REVIEW OF FRACTIONS.

1. Add:	14½	20½	33⅓	14¾	25¼
	3⅓	15⅜	20⅛	9⅜	25¼
	1¼	6¼	11¾	5½	25⅓
2. Add:	81¼	27⅜	56¼	65⅜	80⅜
	80¼	19¼	8½	19¾	5⅜
	5½	3⅜	2¾	7½	10⅜
3. Add:	22½	37½	9½	75¼	84½
	5¼	16½	3½	20¼	10¼
	1½	5⅝	1½	3½	2¼
4. Subtract:	95½	87⅜	70⅓	62⅓	51⅜
	70¼	16¼	24¼	37¼	48¼
5. Subtract:	75½	87⅜	52⅞	40⅝	31⅝
	61⅓	28½	14¼	9¼	13⅓
6. Multiply:	17⅜	45⅝	27⅜	65¼	48⅝
	18	12	24	32	27
7. Multiply:	58⁴	96⅛	83⅝	76⁴	62¼
	49	66	56	28	81
8. Multiply:	29⅝	37⅜	81¼	37⅜	59¼
	48	75	88	99	72
9. Subtract:	84¼	78⅜	81¾	72¼	68⅜
	47¼	52½	63½	49½	34 $\frac{1}{16}$
10. Subtract:	69⅜	19¾	38⅝	42½	79⅞
	52½	11½	19⅜	27¼	58¾
11. Multiply:	66¾	35⅞	87⅝	95⁴	83⅜
	24	32	36	49	48

1. A farmer having 80 sheep, lost 25% of them. How many sheep did he lose?

2. What is 33⅓% of 60 bushels of corn?

3. What is 50% of 36 horses?

4. If I buy hats at $5 each, and sell them at $4 each, what part do I lose? What per cent do I lose?

5. Three-fourths of a number is what per cent of it?

6. 7 oranges are 25% of how many oranges?

7. James gave ½ of a pear to William, ⅓ to George, and kept the rest himself. How much did he give away? How much did he keep?

8. If 2 bbl. of apples are worth $4, what are 8 bbl. worth?

9. What will 3 yd. of cloth cost if 8 yd. cost $32?

10. Two men, A and B, are 21 miles apart. A travels 5 miles an hour, and B follows him, travelling 8 miles an hour. How many miles does B gain on A in one hour? In how many hours will B overtake A?

11. How many tables at $9 each can be bought for $63?

12. If 15 is 3 fourths of some number, what is 1 fourth of the same?

13. 24 is 3 fifths of what number?

14. 24 is ⅝ of what number?

15. 25 is ⅝ of what number?

16. 36 is ⅝ of what number?

17. 20 is ⅝ of what number?

18. 27 is ⁹⁄₁₀ of what number?

19. 15 is ⅗ of what number?

20. If ⅝ of a barrel of fish cost $10, what will 1 barrel cost?

21. 8 is ⅘ of what number?

22. 6 is ⅔ of what number?

23. A is 10 years old, which is ½ of B's age; required B's age.

24. How many thirds in 3½? In 4½?

1. A farmer values his horses at \$350, his cows at \$275, his sheep at \$411.75, his hogs at \$129.25, and his poultry at \$27.25. What is his value of all?

2. From \$369.72 take \$126.41.

3. Multiply 642 by 10. By 100.

4. Multiply 5246 by 18.

5. At \$72 an acre, how many acres of land can be bought for \$2664?

6. Change the following to whole or mixed numbers: —
$\frac{14}{3}$, $\frac{21}{8}$, $\frac{32}{7}$, $\frac{45}{8}$, $\frac{88}{11}$.

7. $17\frac{1}{2} - 8\frac{3}{4} = ?$

8. Multiply $15\frac{8}{9}$ by 9.

9. Multiply $4\frac{7}{8}$ by 9.

10. Find the cost of 1272 articles at 25¢ each.

11. Find the cost of 575 articles at 50¢ each.

12. What is the area of a rectangle 12 rd. by 18 rd.?

13. What is the perimeter of the same rectangle?

14. Find the number of square feet in the ceiling and walls of a room that is 36 ft. by 48 ft. and 12 ft. high?

15. What is 20% of 630 bushels?

16. A farmer has 42 pigs. He keeps 29 pigs, and sells the others at \$5 each. How much does he receive for the pigs he sells?

17. I own 20 acres of land. I keep $18\frac{1}{4}$ acres, and sell the rest at \$40 per acre. How much do I receive for it?

18. Subtract:—

$49\frac{1}{2}$	$68\frac{1}{2}$	10	10	30
$25\frac{1}{2}$	34	$9\frac{1}{2}$	$8\frac{1}{2}$	$27\frac{1}{2}$

19.

10	25	32	54	75
$5\frac{1}{2}$	$6\frac{1}{2}$	$18\frac{1}{2}$	$50\frac{1}{2}$	$74\frac{1}{2}$

20. Multiply 1836 by 32.

1. How many square feet of boards will it take to cover the end of a house 20 ft. long and 12 ft. wide?

2. John bought a sled for $2.00, and lost it. What per cent of his investment did he lose?

3. A man owning a factory worth $2500, sold 50% of it. What was the value of the part sold?

4. A farmer had a flock of 350 sheep, of which 10% were killed. How many sheep did he lose?

5. How many cubic feet in a pile of wood 60 ft. long, 4 ft. wide, and 8 ft. high?

6. If $\frac{2}{3}$ of a farm is worth $4000, what is the value of the whole farm?

7. Mr. A had a farm of 640 acres. He sold $\frac{2}{3}$ of it for $25 an acre. What did he receive?

8. A man bought $\frac{1}{3}$ of 400 acres of land for $118 an acre. What did it cost him?

9. If 18 tons of coal last a factory 126 days, how long will 145 tons last at the same rate?

10. $\frac{2}{3}$ of a farm is worth $6240. What is the whole farm worth? What is $\frac{3}{4}$ of it worth?

11. How many cubic feet in a rectangular block of granite 8 ft. long, 4 ft. wide, and 3 ft. thick?

12. If a cubic foot of granite weighs 155 lb., what is the weight of the block of granite in example 11?

13. I exchanged 15 cords of wood at $6 a cord, for 45 yd. of cloth. What was the value of the cloth a yard?

14. I exchanged 28 horses, worth $115 each, for cows valued at $35 each. How many cows did I receive?

15. What is the cost of 9 tons of coal at $5.50 a ton?

16. In what time will 48 men do a piece of work that 12 men can do in 24 days?

17. What is the sum of $5\frac{1}{4}$, $6\frac{2}{3}$, $4\frac{1}{2}$?

18. Subtract $2\frac{1}{2}$ from $5\frac{5}{8}$.

1. A boy who earned $6 a week, spent $33\frac{1}{3}\%$ of it for dinners. What did he pay for his dinners?

2. A man bought a table for $8, and sold it at a gain of 25%. What did he get for the table?

3. What per cent of 20 is 10? Is 5?

4. What per cent of 100 is 50? Is 25?

5. In a class of 20 children 50% were absent. How many were absent?

6. If a man sells a load of wood for $16 which cost him $12, how much does he gain? What per cent of the cost is the gain?

7. A jeweller bought a pin for $2, which was 50% of what he sold it for. What did he sell it for?

8. If you have 18 marbles and lose 6, what per cent do you lose?

9. A pail of berries weighed 3 lb. After a part was sold it only weighed $66\frac{2}{3}\%$ as much. How much did it weigh then?

10. A man bought a barrel of cranberries for $4.00, and sold them at a gain of 75%. How much did he gain?

11. A grass plot that is 3 vd. square contains how many square feet?

12. Find $\frac{1}{3}$ of 63.

13. Find $\frac{2}{3}$ of 63.

14. Find the difference between $\frac{1}{3}$ of 63 and $\frac{1}{9}$ of 63.

15. Find the difference between $\frac{1}{7}$ of 63 and $\frac{1}{9}$ of 63.

16. A room is 8 yd. long and 5 yd. wide. What is the area of its floor in yards?

17. If this same room is 3 yd. high, what is the area of one side? Of both sides? Of one end? Of both ends?

18. A farmer wishes to make a grain bin 8 ft. long, 5 ft. wide, and 4 ft. deep. How many square feet of boards will he have in the cover? In the bottom? In one end? In one side?

1. Into how many parts is this square divided?

2. One strip is what part of the whole square?

3. In how many different ways is one-tenth written in the illustration?

4. When written in this form, .1, it is called a decimal fraction, and the period is called the decimal point.

5. Two strips are what part of the whole square?

6. Write it in two ways.

7. How many tenths does it take to make a unit?

$\frac{1}{10}$ or .1
$\frac{1}{10}$ or .1
$\frac{1}{10}$ or .1
$\frac{1}{10}$ or .1
$\frac{1}{10}$ or .1
$\frac{1}{10}$ or .1
$\frac{1}{10}$ or .1
$\frac{1}{10}$ or .1
$\frac{1}{10}$ or .1
$\frac{1}{10}$ or .1

8. In the number 412.3, what is the figure at the left of the 2 units called? The figure at the right is called tenths.

9. Why are these figures so called? *Ans.* The figure at the left of units is called tens, because it takes 10 units to make 1 of that place. The figure at the right of units is called tenths, because it takes 10 of them to make a unit, so that 1 of them must be $\frac{1}{10}$ of a unit.

10. Add:

2 books	$2	$\frac{2}{10}$	.2
3 books	$3	$\frac{3}{10}$	.3
4 books	$4	$\frac{4}{10}$	.4

11. How many units are there in 30 tenths?

12. How many units and tenths are there in 25 tenths? Write it decimally.

13. Add: 7.6, 7.8, 5.7, 8.2, 3.4.

14. Add: 9.8, 5.9, 6.5, 9.6, 6.3, 5.7, 5.6.

15. Read 205.6. In reading we say two hundred five *and* six tenths. Notice the decimal point is read as *and*, and this word should be used in reading numbers only to indicate a decimal.

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01

1. How many strips are there in this square? How many little squares are there in each strip?

2. What part of the whole strip is each little square?

3. What part of the whole square is each little square?

4. In what two ways can you write one one-hundredth? $\frac{1}{100}$ or .01.

5. In the expression .01, the cipher means that there are no tenths of a unit, but 1 one-hundredth of a unit.

6. In the number, 125.36, what is the 5 called? 2 called? 3 called? 1 called? 6 called?

7. Tell why each of these figures is so called?

8. 7 small squares are what part of the large square? Write it in figures.

9. Write in figures what represents 4 strips; 4 squares; 2 strips; 6 squares; 3 strips, and 6 squares.

10. Show what part of the whole square is represented by .5; .21; .10; .07; .16; .02.

11. How many tenths and hundredths in .25? .42? .75? .86?

12. Tell how many units, tenths, and hundredths there are in the following: 1.15, 3.06, .07, 1.05, .75, 16.02.

13. Write in decimal form: $\frac{4}{10}$, $\frac{8}{10}$, $\frac{11}{100}$, $\frac{65}{100}$, $\frac{3}{100}$, $\frac{8}{100}$, $\frac{2}{10}$.

14. Read the following sums of money (1) as dollars and cents; (2) as dollars, dimes, and cents; (3) as dollars and tenths and hundredths of a dollar; (4) as dollars and decimals of a dollar: \$5.25, \$1.05, \$10.08, \$6.17, \$5.25.

15. Express the following decimally: 8 tenths, 16 hundredths, 5 hundredths, 8 tenths, 15 hundredths.

1. **2½ ft. and 4½ ft. are how many feet?**
2. **$7.50 and $4.25 equal how many dollars?**
3. $16 + 3 - 9$ $27 + 6 - 4$ $100 - 45$ $100 - 65$
   $42 - 30$ $50 - 16$ $50 - 12$ $100 - 88$
   $64 - 8$ $25 - 7 - 8$ $75 - 62$ $50 - 12$
   $82 - 20$ $60 - 12$ $\$5.00 - \$2.75$ $\$10 - \$4.25$
4. Mr. Brown receives $60. He pays $15 for rent, and $15 for coal. How much has he left?
5. After 16 qt. are put into a bushel basket, how many more quarts are needed to fill it?
6. How do you multiply any number by 10? By 100?
7. How do you divide any number by 10? By 100?
8. Divide: 760 by 10.   800 by 100.   740 by 10.
         890 by 10.   1200 by 100.   870 by 10.
         420 by 10.   6500 by 100.   940 by 10.
         645 by 10.   8750 by 100.
9. Multiply: 18 by 10.   5 by 100.   17 by 10.
          27 by 10.   25 by 100.   48 by 10.
          63 by 10.   32 by 100.   67 by 10.
          95 by 10.   76 by 100.   81 by 10.
10. How many pecks in 40 quarts?
11. How many minutes from half-past eight to nine o'clock?
12. Frank's uncle gave him $2.00, with which he bought two balls for $1.10, and a bat for 50 cents.
13. What will 23 typewriters cost at $100 each?
14. James Smith bought a bicycle for $75, and agreed to pay $11 down, and $8 a month afterwards. How many months did it take him to pay for it?
15. If you cut 2½ in. from a stick 7 in. long, how long a piece will remain?
16. What is the smallest coin in our money?
17. What will ½ bu. of potatoes cost at 25¢ a peck?

NOTE. — Be careful to place the decimal point in your product whenever you write tenths.

Multiply 1.7 by 4.

1.7   4 times 7 tenths are 28 tenths, which equals 2 units
, 4   and 8 tenths.   Write the 8 tenths.   What must you
——   always place before tenths?   Be sure then and write
6.8   the decimal point before tenths.   4 times 1 unit are 4
units, and 2 units are 6 units.   Write the 6 units.   The explanation is similar when the multiplicand is hundredths.

Multiply:

1.	.08	.36	.18	.14	.34	.46
	4	6	4	8	7	6

2.	.38	.75	.06	.46	.51	.49
	5	9	8	3	6	7

3.	1.67	1.39	3.04	2.07	4.73	2.08
	5	8	4	7	3	6

4.	8.07	6.38	8.09	6.03	16.06	9.10
	9	3	7	6	7	5

5.	7.6	10.05	6.04	1.4	1.06	1.07
	7	4	7	9	7	8

6.	4.7	5.07	12.07	8.75	5.09	6.06
	6	7	6	7	8	8

7.	4.06	2.09	15.7	9.08	7.07	12.03
	9	9	8	8	7	7

8.	7.05	6.42	7.65	12.04	8.63	4.23
	6	6	5	5	4	4

Multiply 3.14 by 24.

3.14
24
——
12.56
62.8
——
75.36

In this example the explanation for multiplying by 4 is the same as on page 76. 2 tens are 20, so we say 20 times 4 hundredths are 80 hundredths, or 8 tenths, which is written under tenths. 20 times 1 tenth is 20 tenths, or 2 units, which is written under units. 20 times 3 units is 60 units or 6 tens, which is written under tens.

Multiply:

1.	6.09	8.07	6.38	7.63	8.78	4.23
	42	58	28	82	94	64
2.	8.70	8.00	6.38	8.07	1.67	5.99
	49	75	38·	38	15	53
3.	.83	.75	.83	.73	.06	.47
	16	12	25 ·	32	72	59
4.	1.75	9.36	2.10	4.07	9.16	8.37
	75	65	55	45	35	47
5.	10.06	12.46	11.09	5.25	7.16	7.49
	24	22	20	18	16	48
6.	54.97	68.28	95.56	21.83	16.68	42.85
	94	54	89	29	42	84
7.	79.47	83.74	35.99	42.36	87.61	36.55
	65	49	36	87	98	32
8.	49.72	65.87	84.63	42.54	22.92	89.76
	47	43	89	54	38	47

To multiply decimals by 10, 100, etc.

| 2.4 |
| 10 |
| 24.0 |

Ten times 4 tenths are 40 tenths, which equal 4 units and no tenths. Write 0 tenths. 10 times 2 units are 20 units, and 4 units are 24 units. Write the 24 units. Read your answer. Compare your answer with your multiplicand. What change has taken place in the position of the decimal point?

| 2.46 |
| 100 |
| 246.00 |

The explanation here is the same as that above. Observe the change in the position of the point.

Multiply 3.2 by 10. Multiply 2.42 by 100.

In these examples do you observe the same change in the position of the decimal point?

Multiply:

1.	1.46	2.75	10.0	1.05	9.65	9.06
	10	10	10	10	10	10
2.	9.18	15.15	4.12	7.30	11.09	17.85
	10	10	10	10	10	10
3.	5.16	16.24	3.14	11.12	7.05	91.6
	10	10	10	10	10	10
4.	20.05	10.12	8.06	5.12	7.94	3.69
	100	100	100	100	100	100
5.	8.32	4.7	.16	1.2	1.4	23.7
	100	100	100	100	100	100
6.	75.00	10.0	.10	1.2	1.6	70.5
	100	100	100	100	100	100

Formulate a rule for multiplying a decimal by 10, 100, etc.

NOTE. — If the quotient is placed below the dividend or above, the decimal points come under each other as in addition or subtraction.

To divide a decimal fraction by a whole number, or to find a part of a decimal.

$$3 \overline{) 4.65}$$
$$\overline{1.55}$$

3 is contained in 4 units 1 unit times, and 1 unit remaining. 1 unit is equal to 10 tenths, and 6 tenths make 16 tenths. 3 is contained in 16 tenths 5 tenths times and 1 tenth remaining. 1 tenth is equal to 10 hundredths and 5 hundredths make 15 hundredths. 3 is contained in 15 hundredths 5 hundredths times.

Divide :

1. $4 \overline{) 4.48}$ $5 \overline{) 5.50}$ $2 \overline{) 4.06}$ $8 \overline{) 7.14}$ $5 \overline{) 13.95}$

2. $5 \overline{) 7.10}$ $6 \overline{) 7.02}$ $8 \overline{) 10.64}$ $9 \overline{) 4.68}$ $6 \overline{) 96.06}$

3. $7 \overline{) 46.06}$ $7 \overline{) 45.71}$ $6 \overline{) 10.08}$ $9 \overline{) 10.08}$ $7 \overline{) 18.76}$

4. $8 \overline{) 9.04}$ $6 \overline{) 4.08}$ $7 \overline{) 78.96}$ $5 \overline{) 10.05}$ $8 \overline{) 916.8}$

5. $4 \overline{) 46.08}$ $9 \overline{) 98.73}$ $6 \overline{) 70.02}$ $5 \overline{) 6.05}$ $7 \overline{) 23.45}$

6. $7 \overline{) 80.71}$ $8 \overline{) 72.32}$ $9 \overline{) 39.51}$ $6 \overline{) 21.54}$ $7 \overline{) 41.86}$

7. $7 \overline{) 290.5}$ $4 \overline{) 297.2}$ $6 \overline{) 245.4}$ $9 \overline{) 237.6}$ $7 \overline{) 765.8}$

8. $8 \overline{) 76.88}$ $9 \overline{) 90.36}$ $8 \overline{) 96.72}$ $5 \overline{) 61.65}$ $7 \overline{) 32.34}$

9. $7 \overline{) 42.35}$ $8 \overline{) 35.92}$ $8 \overline{) 83.44}$ $9 \overline{) 77.31}$ $5 \overline{) 78.05}$

10. $6 \overline{) 746.4}$ $4 \overline{) 48.72}$ $9 \overline{) 74.52}$ $8 \overline{) 653.6}$ $7 \overline{) 868.1}$

To find a part of a decimal, or to divide a decimal fraction
by a whole number of 2 figures.

```
      1.32
36 ) 47.86
      36
      ‾‾‾
      118
      108
      ‾‾‾
      106
       72
      ‾‾‾
       34
```

The explanation here is the same as on page 79,
and need not be repeated. Place the point when
you write tenths. Notice also that the point in the
quotient comes above the point in the dividend.

Divide:

1. 24) 45.84   35) 474.25   46) 17.48   26) 58.50

2. 57) 68.97   68) 108.8   79) 56.09   35) 52.50

3. 83) 748.66   92) 800.4   23) 48.76   30) 642.0

4. 34) 768.4   45) 62.10   56) 80.64   32) 684.8

5. 67) 74.37   78) 81.12   89) 925.6   34) 69.02

6. 91) 982.8   22) 46.20   33) 475.2   35) 72.45

7. 44) 55.44   55) 62.15   66) 481.8   45) 96.48

8. 77) 816.2   88) 95.92   99) 100.98   36) 86.04

9. 82) 90.20   27) 69.39   53) 86.39   43) 83.85

10. 49) 98.49   62) 91.14   42) 957.6   53) 869.2

11. 37) 26.64   36) 219.6   35) 122.5   47) 150.4

12. 92) 56.12   72) 48.24   98) 607.6   23) 49.91

13. 23) 95.91   82) 36.90   78) 66.30   28) 84.56

14. 72) 663.4   61) 561.2   52) 94.64   43) 52.89

NOTE. — If the pupils cannot read to thousandths, teach them to do so.

To divide a decimal fraction by 10, 100, etc.

$$10 \overline{)\, 2.40 \above 0pt .24}$$

10 is not contained in 2 units. Change 2 units to tenths. 10 is contained in 24 tenths 2 tenths times and 4 tenths remaining. Change 4 tenths to hundredths. 10 is contained in 40 hundredths 4 hundredths times. Compare your answer, .24, with your dividend, 2.4. What change has been made? What short way then can you discover to divide any decimal by 10?

Divide the following numbers by 10:

1. 45.75	26.9	18.85	64.7	19.01
2. 303.4	19.09	87.07	65.05	5.15
3. .8	.68	.9	.14	.57
4. .90	48.12	95.19	60.2	96.09
5. 84.32	75.01	84.5	5.5	50.5
6. 48.6	5.76	5.53	86.07	25.5
7. 15.85	6.87	62.5	11.93	30.09
8. 62.40	7.37	92.46	95.78	50.63
9. 13.14	7.55	8.62	46.02	18.96
10. 24.65	.67	100.75	15.75	1.05

Divide the following numbers by 100.

11. 62.02	37.62	57.36	47.33	16.66
12. 3.52	37.75	80.06	45.08	84.63
13. 84.08	16.07	2.9	1.96	10.3
14. 15.34	65.04	9.08	16.66	18.06
15. 95.37	35.75	26.37	19.08	23.04
16. 38.5	4.05	47.62	28.7	18.92
17. 3.40	3.24	2.56	5.75	30.30
18. 32.4	1.8	82.5	62.5	4.53
19. 6.24	67.5	6.75	.67	13.5
20. 17.59	36.15	12.45	4.82	31.81

Formulate a rule for dividing a decimal by 10, 100, etc.

To find a decimal part of a decimal or to multiply a decimal fraction by a decimal fraction.

Multiply 2.4 by .4.

$\begin{array}{r} .2\,/4 \\ /4 \\ \hline .96 \end{array}$
This example means find 4 tenths of 2.4. We first find $\frac{1}{10}$, as in Lesson 67. We find this to be .24. If .24 is $\frac{1}{10}$, $\frac{4}{10}$ will be 4 times .24 (page 77), which is .96.

NOTE. — By this method the points before the 4 in both multiplicand and multiplier are removed, and the single point before the 2 takes their place. To change these points, as in the illustration, takes only a second of time.

| 1. | 2.5 | 46.05 | 1.6 | 3.25 | 5.07 |
| | .5 | .4 | .7 | .6 | .8 |

| 2. | 4.8 | 16.04 | 7.25 | 4.03 | 8.15 |
| | .9 | .7 | .4 | .5 | .8 |

| 3. | 1.7 | 2.3 | 6.5 | 8.9 | 7.2 |
| | .9 | .8 | .7 | .6 | .5 |

| 4. | .15 | .12 | .18 | .20 | .05 |
| | .4 | .3 | .2 | .6 | .7 |

| 5. | 1.05 | 2.06 | 3.07 | 4.08 | 5.09 |
| | .5 | .4 | .6 | .8 | .7 |

| 6. | 4.22 | 5.33 | 6.44 | 7.55 | 8.66 |
| | .9 | .8 | .5 | .6 | .7 |

| 7. | .35 | .76 | .84 | .03 | .16 |
| | .5 | .6 | .7 | .8 | .9 |

| 8. | .50 | .60 | .76 | .05 | .07 |
| | .4 | .6 | .5 | .7 | .8 |

9. Formulate a rule for finding a decimal part of a decimal.

NOTE. — Be sure to change the points before multiplying.

.24/65
/24
——————
.9860
4.930
——————
5.9160

To find $\frac{24}{100}$ of 24.65, we first find $\frac{1}{100}$ of it, which (page 81) is .2465. If .2565 is $\frac{1}{100}$, $\frac{24}{100}$ will be 24 times .2465, which is (page 77) 5.9160.

1.	64.06	70.30	80.04	86.65	80.34
	.25	.36	.47	.58	.69

2.	70.09	30.08	80.09	68.40	94.06
	.15	.26	.37	.48	.59

3.	3.94	4.50	8.60	2.45	5.42
	.26	.38	.49	.51	.62

4.	3.28	4.48	6.62	8.04	6.42
	.17	.28	.39	.41	.53

5.	.08	.03	.14	.34	.75
	.98	.87	.76	.65	.54

6.	.06	.46	.51	.63	.74
	.88	.77	.66	.55	.44

7.	1.67	1.39	8.04	2.79	4.73
	.96	.85	.74	.63	.52

8.	6.09	7.06	9.08	6.07	9.04
	.38	.75	.69	.46	.51

9.	60.94	70.68	90.09	16.07	10.96
	.63	.35	.74	.43	.65

10.	30.75	56.03	80.76	76.38	40.60
	.16	.67	.13	.39	.96

1. 76 tenths are how many ones?

2. Nineteen are how many times 3 ?   7 ?   4 ?   5 ?   8 ?   6 ?
9 ?   2 ?   10 ?

3. Twenty-seven are how many times 9 ?   6 ?   4 ?   3 ?   7 ?
8 ?   5 ?   10 ?

4. If 6 is ¾ of some number, what is 1 fourth of the same
number?

5. 9 is 3 fourths of what number?

6. 8 is 4 ninths of what number?

7. 9 is 3 tenths of what number?

8. 10 is 5 sevenths of what number?

9. 12 is 3 fifths of what number?

10. If I plant ⅛ of my garden with peas, ⅛ with beans,'⅜ with
potatoes, and ⅔ with tomatoes, how many eighths shall I have
left for other things?

11. A man who had a fence to build, found that it took him
4 days to build 2 fifths of it.   How many days did it take him
to build the whole fence?

12. What will 5 pictures cost at 8⅜¢ each?

13. What will 12 hats cost at $3¾ each?

14. How many oranges will it require to give each of 9 boys
1⅓ oranges?

15. 5 times 4 and ¾ of 4 are how many?

16. 9 times 7 and ⁴⁄₇ of 7 are how many?

17. 5 times 10 and ⅘ of 10 are how many?

18. 7 times 6 and ⅔ of 6 are how many?

19. What will 6 boxes of raisins cost at $3⅔ a box?

20. A boy gave ⅘ of a dollar for a hat, $1⅔ for a vest, and
had $3⅘ remaining.   How much had he at first?

21. 14 is 2 sevenths of what number?

22. 15 is 3 halves of what number?

23. 24 is 8 fifths of what number?

NOTE. — Do not compel each child to perform all.

1. The following represents cash received and cash paid out in a store for the month of March. Find the difference for each day, and for the month.

	RECEIVED.	PAID.		RECEIVED.	PAID.
1.	$247.85	$218.15	17.	$ 32.98	$ 3.95
2.	5.96	53.86	18.	500.00	188.50
3.	10.00	27.89	19.	50.00	74.00
4.	8.13	5.06	20.	48.75	50.00
5.	397.63	98.32	22.	85.35	79.85
6.	142.15	114.18	23.	18.50	41.25
8.	16.85	7.62	24.	45.50	134.14
9.	2.63	3.27	25.	446.14	9.63
10.	18.95	20.25	26.	532.13	2.65
11.	215.12	14.98	27.	513.68	1.60
12.	32.98	25.00	29.	180.00	27.84
13.	47.63	92.80	30.	39.39	14.65
15.	87.63	3.85	31.	557.00	136.00
16.	254.85	215.12			

2. Multiply 10⅔ by 9.

3. Reduce 45 bu. 3 pk. 5 qt. to quarts.

4. How many hours are there in 3 wk. 5d. 10 hr. ?

5. How many square rods are there in a rectangular field 40 rd. long and 20 rd. wide?

6. How much will it cost to fence this field at $1 a rod ?

7. In a rectangular block of stone 6 ft. long and 2 ft. square, how many cubic feet?

8. How many square feet in the entire surface of this block of stone?

9. Bought a horse for $216, and sold him at a loss of 10%. How much was the loss ?

10. Multiply 4.02 by 10.   By 100.

Since 33⅓¢ is ⅓ of $1, it follows that three articles will cost $1; hence any number of articles at 33⅓¢ each will cost as many dollars as ⅓ the number of articles.

Since 20¢ is ⅕ of $1, it follows that 5 articles will cost $1; hence any number of articles at 20¢ each will cost as many dollars as ⅕ the number of articles.

Find cost, at 33⅓¢ each, of:

1. 36 yd. of ribbon.
3. 48 lb. of butter.
5. 27 lb. of butter.
7. 66 lb. of meat.
9. 933 yd. of velvet.
11. 600 pk. of peaches.
13. 12 gal. of molasses.
15. 624 doz. oranges.
17. 420 pt. of ice-cream.
19. 981 lb. of turkeys.

Find cost at 20¢ each of:

2. 65 pairs of cuffs.
4. 55 pk. of walnuts.
6. 75 doz. oranges.
8. 155 yd. of cloth.
10. 735 books.
12. 80 jars of jelly.
14. 695 lb. of meat.
16. 105 yd. of sheeting.
18. 5175 lb. wool.
20. 600 bu. tomatoes.

Multiply:

21. 25 cents by 240.
23. 50 cents by 186.
25. 33⅓ cents by 156.

22. 33⅓ cents by 66.
24. 20 cents by 640.
26. 50 cents by 84.

Find the cost of:

27. 2504 dolls at 25¢.
29. 933 yd. of cloth at 33⅓¢.
31. 72 articles at 33⅓¢.
33. 72 articles at 50¢.

28. 1728 hats at 50¢.
30. 695 lb. of meat at 20¢.
32. 72 articles at 25¢.
34. 570 articles at 20¢.

35. Multiply: $\frac{5}{16}$ by 8. $\frac{7}{12}$ by 4. $\frac{9}{20}$ by 10. $5\frac{4}{13}$ by 6.
            $\frac{4}{14}$ by 7. $\frac{3}{16}$ by 8. $\frac{5}{12}$ by 12. $9\frac{2}{3}$ by 9.

36. Multiply: $\frac{1}{11}$ by 10. $\frac{8}{9}$ by 9. $\frac{5}{16}$ by 6. $4\frac{2}{3}$ by 8.
            $\frac{8}{9}$ by 80. $\frac{7}{8}$ by 4. $\frac{1}{11}$ by 7. $7\frac{1}{3}$ by 6.

37. Multiply: $1\frac{1}{3}$ by 6. $5\frac{3}{8}$ by 8. $2\frac{1}{3}$ by 8. $2\frac{1}{3}$ by 12.
            $1\frac{1}{3}$ by 6. $4\frac{2}{3}$ by 9. $5\frac{3}{8}$ by 8. $7\frac{3}{8}$ by 8.

1. Give products : —

684 × 10   68.4 × 10   3128 × 10

57.1 × 100   5.71 × 10   .961 × 100

.57 × 100   .09 × 100   .02 × 100

2. Give quotients : —

932 ÷ 100   684 ÷ 100   86 ÷ 10

328 ÷ 10   57.6 ÷ 10   24.3 ÷ 100

8.75 ÷ 10   932.5 ÷ 100   48 ÷ 100
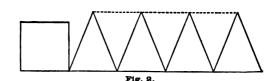
3. How many square feet in a rectangle 2 ft. long and 1 ft. wide? In one 6 ft. long and 5 ft. wide? In one 9 ft. long and 7 ft. wide?

4. A man sees 15 pigeons on one branch of a tree and 9 pigeons on another branch. If 7 should fly away, how many would be left on the tree?

5. A farmer had 23 chickens, but 7 of them were stolen, and 5 were carried off by a hawk. How many chickens had he left?

6. Mr. S. is 44 years old, and his youngest son is 8 years old. What is the difference in their ages?

7. A man, having $23, gave $6 for a hat. How many dollars had he left?

8. What part of a gallon is 1 quart? 2 qt.? 3 qt.? 4 qt.?

9. How many pints in 8 qt.? 11 qt.? 15½ qt.? 20 qt.?

10. At 4¢ a pint, what will 5 qt. of milk cost?

11. How many bushels in 12 pk.? 20 pk.? 32 pk.? 40 pk.?

12. What part of a bushel is 1 pk.? 2 pk.? 3 pk.? 4 pk.?

13. How many weeks in 35 days? In 49 days?

14. What per cent of 120 is 60?

15. What per cent of 12 is 3?

16. $70 is 10% of how many dollars?

17. A dealer paid $5 for a hat, and sold it at 20% profit. What was the selling price?

1. Can you tell the name of what I hold in my hand?

2. Why is it called a *square* pyramid?

3. As this pyramid stands on my hand, can you see this line running from the middle of the base to the vertex?

4. Is it a vertical line? What kind of a line is it? *Ans.* Slanting or oblique line.

5. Look at this figure. Does AB measure the height of the triangle ABC? What line does measure the height of the triangle?

6. Does this slanting line on the pyramid measure the real height of the pyramid?

7. Where must we measure to get the real height of the pyramid?

8. What name can we give to this slanting line? *Ans.* Slant height.

9. Now look at one face of the pyramid? What shape is this face?

10. What line is the altitude of the isosceles triangle?

11. Point to the slant height. How many faces has the pyramid? Each face is what? Point to the altitude of each face.

12. How do you find the area of an isosceles triangle? The base is 10 in., the altitude 8 in. What is the area?

13. To find the surface of this pyramid you must find the area of how many isosceles triangles, and of what other figure?

14. Let us measure this pyramid. The base is 4 in. and the slant height 9 in. How many square inches in one face? How many in the 4 faces? How many in the base? How many in the whole pyramid?

Fig. 1.   Fig. 2.

1. Look at Fig. 2. That is the way we illustrate the base and four sides of a pyramid. We connect the tops with a dotted line to show that when in position they would touch.

Find the entire surface of the following square pyramids and illustrate each, using ¼ in. to represent an inch or a foot according to the dimensions given:

2. Base 6 in., slant height 10 in.
3. Base 8 in., slant height 12 in.
4. Base 10 in., slant height 14 in.
5. Base 7 in., slant height 12 in.
6. Base 9 in., slant height 12 in.
7. Base 11 in., slant height 14 in.
8. Base 15 in., slant height 20 in.
9. Base 24 in., slant height 36 in.
10. Base 20 ft., slant height 42 ft.
11. Base 12 in., slant height 18 in.
12. Base 13 in., slant height 16 in.
13. Base 14 in., slant height 20 in.
14. Base 12 in., slant height 36 in.
15. Base 18 in., slant height 40 in.
16. Base 16 in., slant height 36 in.
17. Base 15 in., slant height 18 in.
18. Base 11 in., slant height 16 in.
19. Base 20 in., slant height 30 in.
20. Base 24 in., slant height 40 in.
21. The perimeter of the square base is 32 ft., and the slant height 16 ft. Find the entire surface.

1. Add: $\frac{1}{3}$ and $\frac{1}{2}$. $\frac{1}{4}$ and $\frac{2}{3}$.

2. Subtract: $\frac{1}{3}$ from $\frac{9}{10}$. $\frac{1}{2}$ from $\frac{5}{6}$.

3. If 1 book costs 1\frac{1}{4}$, what will 8 books cost?

4. If a pound of coffee costs 32 cents, what will $\frac{3}{4}$ of a pound cost?

5. I spent $6, which was $\frac{1}{3}$ of all my money. How much money had I?

6. 32 is $\frac{4}{5}$ of what number?   48 is $\frac{3}{5}$ of what number?

7. How much is 3 times $\frac{9}{10}$?

8. How much is 7 times $\frac{8}{100}$?

9. Change $5 to cents.

10. Change 500 cents to dollars?

11. What part of a dollar is 50 cents? 33$\frac{1}{3}$ cents? 25 cents? 20 cents?   10 cents?

12. At 25$\cent$ a box, what will 12 boxes of berries cost?

13. At 33$\frac{1}{3}$ $\cent$ a yard, what will 18 yd. of cloth cost?

14. At 50$\cent$ a gallon, what will 20 gal. of molasses cost?

15. At 20$\cent$ a dozen, what will 45 doz. eggs cost?

16. What is the cost of 27 ft. of picture cord at 10$\cent$ a yd.?

17. How many gills in 5 pt.?   In 9$\frac{1}{4}$ pt.?

18. How many quarts in 7 gal.?   In 8$\frac{1}{2}$ gal.?

19. How many days in 12 wk. 6 da.?   In 11 wk. 4 da.?

20. Find the number of cubic inches in a 3-in cube.

21. Find the number of square inches in the entire surface of a 3-inch cube.

22. How many edges has a cube?   What is the length of all the edges of a 3-inch cube?

23. Multiply 25 by 10.   2.5 by 10.

24. Divide 450 by 10.   4.5 by 10.

25. If a person leaves his property, wortn $2700, to his wife and 8 children, in equal parts, how many dollars will each have?

26. How much is $\frac{1}{7}$ of 63?   84?   140?   280?   700?

12

12½	6
6⅔	8
8¼	3
15⅚	10
2⅓	4

43   $\frac{31}{12} = 2\frac{7}{12}$

$2\frac{7}{12}$

$45\frac{7}{12}$

1. Add 12½, 6⅔, 8¼, 15⅚, 2⅓.

NOTE. — Instead of writing the common denominator, 12, with each fraction, we place it above, and only write the numerators. The same method can be used in subtraction.

2. Subtract:

8¼	23½	34⅔	16¼	21¼
5½	5¾	27⅓	8½	9¾

3. From a piece of cloth containing 17½ yd., there were sold 5¾ yd. and 4⅔ yd. How many yards were left?

4. A merchant sold 17¾ yd. of muslin, 14½ yd. of silk, and as many yards of calico as of the other two together. How many yards did he sell in all?

5. Divide 6273 by 9.

6. Add: $8.34, $40.39, $638.27, $594.38, $1.97.

7. Find the cost of the following: 486 bu. wheat @ $1.04 a bushel.

8. 208 sheep @ $4.65 a head.

9. 984 bu. onions @ $1.09 a bushel.

10. 809 tons of hay @ $11.45 a ton.

11. 208 lb. of coffee @ 28¢ a pound.

12. 11 sheep @ $7.47 each.

13. Change 15 bu. 4 pk. to pecks.

14. Change 1494 min. to hours.

15. Multiply 27.13 by .67.

16. Reduce 27 ft. 8 in. to inches.

17. If 3 fourths of an acre of land cost $108, what will 1 fourth cost? What will the whole acre cost?

18. From .96 take .35.

19. Multiply:

609.4	706.8	900.9	160.7	109.6
.63	.35	.74	.43	.19

1. A man sold his horse for $375, and thus gained $75. What was the cost of the horse?

2. Divide 615 by 15, and multiply the quotient by 25.

3. A farmer purchased 125 cows for $3125. How much did each cow cost?

4. A horse is sold for $200.50, some cows for $250.63, two yokes of oxen for $300.38, and a carriage for $160. What is the value of the whole?

5. Bought some tea for $111.75, and sold it for $152.35. How much did I gain?

6. If 1 yd. of cloth costs $5.25, what will 236 yd. cost?

7. Bought 658 bu. of salt at $1.05 a bushel. Find the cost.

8. A grocer sold 75 cans of tomatoes for $31.50. How much did he receive for each can?

9. Change $\frac{3}{4}$ to 8ths; $\frac{5}{6}$ to 12ths; $\frac{3}{5}$ to 10ths.

10. In $\frac{27}{4}$ of a yard, how many yards?

11. Find the sum of $\frac{3}{13}$ and $\frac{5}{6}$.

12. Add $19\frac{1}{2}$, $20\frac{1}{3}$, $21\frac{1}{4}$, $22\frac{2}{3}$.

13. Add $5\frac{1}{4}$ in., $4\frac{3}{4}$ in., $2\frac{1}{4}$ in., and $9\frac{3}{16}$ in.

14. From $18\frac{6}{8}$ take $12\frac{1}{2}$.

15. From a piece of cloth containing $27\frac{3}{4}$ yd., $18\frac{6}{8}$ yd. were taken.

16. What is the cost of 36 doz. eggs at $37\frac{1}{2}$¢ a dozen?

17. If a pair of chickens cost $1\frac{1}{4}$, what will 10 pairs cost?

18. If I pay 6 cents for 5 apples, what is the cost of 1 apple?

19. How far can a man walk in 26 hours at the rate of $2\frac{1}{2}$ miles an hour?

20. How many quarts of strawberries have you, if you have 2 bu. 2 pk. 2 qt.? How much are they worth at 15¢ a quart?

21. How many square feet in a floor 32 ft. long by 21 ft. wide?

22. A box is 3 ft. long, 2 ft. wide, and 1 ft. thick. How many square feet in its surface? Make a diagram.

23. Find the cubic feet in this box.

1. There are 27 pages in his primer, and George has read 15. How many has he yet to read to finish the primer?

2. A boy who is 14 years old, says that he is 5 years older than his younger brother, and 4 years younger than his older brother. How old are his brothers?

3. A grocer pays 40 cents for a pound of tea, and sells it for 55 cents. How much does he gain? How much would he gain on 2 lb. of tea at the same rate?

4. John has 40 plums, and gives $\frac{1}{4}$ of them to Nellie. How many has he left?

5. I paid 7 cents for 1 cake, 7 cents for another, and 7 cents for another. Find in two ways how many cents I paid out.

6. How much more is 4 plus 3 minus 2, than 2 plus 8 minus 6?

7. A storekeeper sold 15 pairs of shoes Monday, 9 Tuesday, 7 Wednesday, 11 Thursday. How many pairs of shoes did he sell?

8. What will be paid for $\frac{1}{3}$ of a yard of ribbon at 4¢ a yard?

9. If there are 31 gal. of oil in a barrel, how many gallons will there be after 11 gal. are sold?

10. If a family use a gallon of milk a day, how many quarts do they use in a week?

11. How many marbles will Mr. Smith have to buy to give a dozen to each of his 4 boys?

12. Louis has 9 doves, and John has 5 times as many. How many have both boys?

13.

$\frac{1}{4}$ of 24	$\frac{2}{4}$ of 24	$\frac{1}{2}$ of 24	$\frac{3}{4}$ of 24
$\frac{4}{4}$ of 24	$\frac{3}{8}$ of 24	$\frac{3}{8}$ of 24	$\frac{1}{3}$ of 24
$\frac{1}{8}$ of 24	$\frac{2}{8}$ of 24	$\frac{3}{8}$ of 24	$\frac{4}{8}$ of 24
$\frac{5}{8}$ of 24	$\frac{6}{8}$ of 24	$\frac{1}{6}$ of 24	$\frac{3}{8}$ of 24

14. If $\frac{1}{7}$ of the 280 pupils of a school are absent, how many are absent? How many are present?

15. How much is $\frac{3}{4}$ of 12? $\frac{2}{5}$ of 10? $\frac{3}{5}$ of 20?

16. How much is $\frac{5}{8}$ of 18? $\frac{2}{7}$ of 21? $\frac{4}{5}$ of 35?

1. A grain dealer sold wheat as follows: — Monday 2176 bu., Tuesday 1085 bu., Wednesday 1694 bu., Thursday 2642 bu., Friday 918 bu., and Saturday 2867 bu. How many bushels did he sell during the ·week?

2. A merchant began business with goods worth $5680 and a store worth $3462. He gained during the year $1267. What was he then worth?

3. I bought a suit of clothes for $27.50, an overcoat for $18.75, a pair of shoes for $4.75, a hat for $2.65 and a pair of gloves for $1.38. What was the cost of all?

4. A owns 468 acres of land, which is 182 acres less than B owns. How much land have A and B?

5. A owns 316 acres of land, B owns 78 acres more than A. How many acres does B own? C owns as many as A and B together. How many acres does C own?

6. A farmer values his horses at $375, his cows at $415, his sheep at $118, his hogs at $65, and his poultry at $74. What is the value of all?

7. Four men went into business together. A put in $1768, B, $1848, C, $1715 and D, $968. How much did they all put in?

8. A man bought a house for $4200, paid $185 for repairs, and $216 for painting. For how much must he sell it in order to gain $300?

9. A merchant paid $427 for one lot of goods, $657 for another and $452 for a third. How much did they all cost?

10. Mr. Fraser's house cost for brick $324, for lumber $726, other material $315. He paid to the carpenters, $569, to the masons $568 and to the painters $418. What was the entire cost of the house?

11. Find the entire weight of five loads of hay weighing respectively 1986 lb., 2240 lb., 2086 lb., 1789 lb., 2064 lb.

1. I bought a farm for $7634 and sold it for $9472. What did I gain?

2. How many dollars are $8142 minus $6785?

3. A man paid $6148 for a farm and $3862 for a house. How much more did he pay for the farm than for the house?

4. A merchant gained $4240 in business. If he then had $6410, how much had he at first?

5. From $9246 take $7438.

6. How much larger is $8765 than $7874?

7. A farmer raised 1346 bu. of wheat one year and 1562 bu. the next year. How many more bushels did he raise the second year than the first?

8. A fruit dealer had 1142 baskets of peaches and sold 975 baskets. How many baskets had he left?

9. A man owns $8427 worth of property. If he owes $2728, how much is he worth?

10. The sum of two numbers is 8092. If one number is 4129, what is the other?

11. A man bought a house and lot for $5624. The house cost $4698. What did the lot cost?

12. A dealer bought some property for $6484 and sold it for $8726. What did he gain?

13. A father gave his son $7263 and his daughter $5264. How much more did he give the son than the daughter?

14. How much greater than 4569 is 8186?

15. What number must be added to 2675 to make 4128?

16. A coal dealer, having 7528 tons of coal, sold a part and had 1849 tons left. How many tons did he sell?

17. A merchant imported goods which he sold at a profit of $1736. If he received $5182 for them, what did they cost him?

1. Having 27 apples, I sold ⅔ of them. How many did I have left?

2. I had 24 peaches, and gave ⅓ of them to Grace and ⅓ to Nellie. How many did I have left?

3. A boy had 36 chickens. He sold ½ of them, and a cat killed ⅓. How many remained?

4. Susan's age is 24 years, and her sister is ⅔ as old. How old is her sister?

5. 6 eighths of 64 are how many?

6. What are ⅐ of 14? Of 35? 49? 28?

7. What are 4 ninths of 9? 36? 54? 81?

8. John had a melon, and gave ⅐ of it to Mary and ⅕ to Harry. What part of the whole melon did he give away?

9. What is the cost of 11 bbl. of flour at the rate of 5 bbl. for $30?

10. What are 10 oranges worth, if 8 oranges are worth 16¢?

11. What will 1 box of soap cost, if ¾ of a box cost $6?

12. If $10 will buy ⅘ of a ton of hay, what will 1 ton cost? 5 tons?

13. 9 is ⅓ of what number? 7 is ⅓ of what number?

14. 9 is ⅓ of what number? 11 is ¼ of what number?

15. George has 20 marbles, which is ¼ of John's. How many has John?

16. If 4 yd. of cloth cost $10, what will 8 yd. cost?

17. If 5 pairs of shoes cost $9, what will 20 pairs cost?

18. What is ⅓ of 5? ¼ of 6?

19. What is ⅓ of 9? ⅓ of 20?

20. A man bought a watch for $20, and sold it for $25. How many dollars did he gain? What part of the cost did he gain? What per cent did he gain?

21. A grocer is putting up cloves in packages of ¼ of a pound each. If he uses 7¼ lb., how many packages has he?

1. I had $324 in my pocket book and paid out of it to one man $176 and to another $78. How much did I have left?

2. A man owned 1764 acres of land. He sold 1126 acres to one man and 242 acres to another. How many acres had he left?

3. A farmer had 176 sheep and bought 258 more. He then sold 285 sheep. How many had he left?

4. A grain-dealer bought wheat as follows: 668 bu. 877 bu. and 1494 bu. He then sold 1986 bu. How many bushels had he left?

5. A man put into a bank $1176 at one time, $1258 at another, and $1379 at another. How much had he left in the bank after taking out $1486?

6. A farmer bought a horse for $156, a harness for $36 and a buggy for $185. He paid $169 in cash. How much is yet to be paid?

7. A man bought a lot for $1356 and put a fence around it at a cost of $78. He then sold it for $1800. How much did he gain?

8. I had $575 in business and lost $275 and then gained $356. Afterwards I lost $468; how much did I then have?

9. A man owned 479 acres of land and bought 268 more. He then sold 174 acres at one time, and at another 132 acres. How many acres did he have left?

10. A merchant had $1254 in his cash drawer Monday morning and received from sales during the day $575. If he paid out $869 what is his cash balance at the end of the day?

11. At the beginning of a month I had $875 and during the month I made $294. My expenses for the month were $267. How much did I have at the end of the month?

12. A and B entered into business. A furnished $725 and B $167 less than A. How much did both furnish?

1. Mr. B's income is $2496 a year and Mr. P's is 13 times as much. What is Mr. P's income?

2. There are 5280 ft. in a mile. How many feet are there in 967 miles?

3. If a man travels at the rate of 47 miles a day, how far can he travel in 309 days?

4. At the rate of 56 bu. an acre, how much corn can be raised on 468 acres of land?

5. If a carriage wheel revolves 465 times in running a mile, how many times will it revolve in running 94 miles?

6. A boat was loaded with 678 bales of hay, each weighing 209 lb. What was the weight of the cargo?

7. A planter raised 307 bales of cotton, each bale weighing 468 lb. How many pounds of cotton did he raise?

8. If a garrison of soldiers consume 925 lb. of bread every day, how many pounds will supply the garrison 708 days?

9. What will it cost to build 789 miles of railroad at $5687 a mile?

10. If a ship sails 276 miles a day, how far will it sail in 189 days?

11. A field is 265 rd. long and 74 rd. wide. What is its area in square rods?

12. There are 2240 lb. in a long ton. How many pounds are there in 625 tons?

13. At $1965 each, what will 368 building lots cost?

14. A coal dealer bought 785 tons of coal at $4.75 a ton. What was the entire cost?

15. There are 128 cubic feet in one cord of wood. How many cubic feet are there in 364 cords?

16. An army eats 2878 lb. of meat in one day. How many pounds will it eat in 316 days?

17. What will 95 tons of hay cost at $18.75 a ton?

1. Find ⅓ of $48.   Of 42 dimes.   54 cents.   72 horses.

2. Find ⅓ of 30 lemons.   Of 18 days.   12 trees.   15 books.

3. I went to the store with 36 cents, and spent all but 30 cents.   What part of my money did I spend?

4. If John paid $8 for a vest, and 3 times as much for a coat, how much did he pay for both?

5. ⅐ of 35 weeks?   49 hours?   28 months?   63 days?

6. George is ⅐ of 77 years old.   How old is he?

7. A boy was asked how many marbles he had, and replied, "This morning I had 8 times as many as I now have, and I had 96 then."   How many has he?

8. If I should sell 12 bbl. of flour, worth $6 a bbl., for $69, how many dollars should I lose?

9. Bessie's grandfather is 81 years old, and she is ⅑ as old. How old is Bessie?   In how many years will she be 18 years old?

10. 3 is what part of 3?   Of 6?   9?   12?   15?   30?

11. 3 is what per cent of 3?   Of 6?   9?   12?   15?   30?

12. Find the cost of $\frac{1}{11}$ of 66 cows at $20 each.

13. A man kept 15 sheep in one field, 9 in another, 8 in a third, and 7 in a fourth.   How many sheep did he have?

14. Add 36, and 10, and 4, and 10, and 2, and 8.

15. Add 36, and 14, and 12, and 8.

16. Add:

$50 + 80 + 30 = ?$	$10 + 90 + 50 = ?$	$20 + 40 + 60 = ?$
$40 + 80 + 20 = ?$	$80 + 40 + 10 = ?$	$80 + 30 + 40 = ?$
$60 + 20 + 80 = ?$	$60 + 10 + 70 = ?$	$60 + 70 + 50 = ?$

17. A farmer had 24 cows, and ¾ as many sheep.   How many more cows than sheep had he?

18. How much is 11 times 3 less ⅛ of 40?

19. How much is 7 times 4 less ¾ of twice 8?

1. I bought 25 barrels of apples at $3 a barrel, and 15 barrels of crackers at $4 a barrel. How much did the whole cost?

2. A man bought 235 chairs at $2 each and 38 chamber sets at $14 each. How much did he pay for all?

3. I bought 135 cd. of wood of one man and 278 of another. At $5 a cord how much did all the wood cost me?

4. A drover sold 39 cows at $37 each, and 28 horses at $165 each. How much did he receive for all?

5. A farmer bought 6 cows at $37 each, a span of horses for $210, and a colt for $65. What did he pay for all?

6. A grocer bought 275 bbl. of apples at $2 a barrel and sold them at a profit of $1 a barrel. What did he receive for his apples?

7. A farmer sold 14 loads of hay to one man, 13 loads to another and 12 loads to another. If the average weight was 975 lb. how much did they all weigh?

8. If I hire a carpenter for $55 a month and his apprentice at $27 a month, how much will be due them at the end of 9 months?

9. Charles has 98 cents and Clarence 8 times as many cents as Charles. How many cents have both?

10. If a clerk has $35 a month for the first 4 mo., $46 a month for the next 4 mo., and $58 a month for the next 4 mo., what will he receive for the year?

11. If a man earns $45 a mouth and his boy $23 a month, how much will they both earn in 9 months?

12. Find the cost of 8 yd. of velvet at $1.50, 7 yd. of satin at $1.75 and 6 yd. of lace at 88¢.

13. A drover bought 8 horses at $165 a head and 9 cows at $34 a head. Find the cost of all.

14. A's barn cost $285 and his house 9 times as much. What was the cost of both house and barn?

1. A tailor has a piece of cloth containing 137 yd. How many yards will he have left after cutting from it 26 suits, if each suit contains 4 yd. ?

2. One man owes another $925. He gives in part payment 68 sheep at $4 each and 12 cows at $36 each. How much does the first man still owe ?

3. How much less must be given for 18 head of cattle at $48 a head than for 16 horses at $85 each ?

4. A man bought 27 cows at $26 each and gave in exchange 24 tons of hay at $18 a ton. How much does he still owe ?

5. How much more will 27 horses cost at $135 each, than 86 cows at $25 each ?

6. A dealer sold 86 boxes of oranges at $4 a box and gained $65. Find the cost of the oranges.

7. A drover bought 120 sheep at $5 a head and sold 80 of them at $6 a head and the rest at $7 a head. How much did he gain ?

8. Which are worth more, 647 acres of land at $28 an acre or 39 building lots at $585 each? How much more ?

9. A drover had 126 head of cattle and 96 horses. He sold the cattle at a gain of $8 a head, and the horses at a loss of $10 a head. Did he gain or lose and how much ?

10. If a man earns $272 a month and spends $148 a month, how much can he save in 8 months ?

11. A lady had $32. She bought 15 yd. of cashmere at 75¢ a yard and a jacket for $6. How much had she left ?

12. How much more will 8 yd. of cloth cost at $3.75 a yard than 7 yd. at $3.25 a yard ?

13. A flour merchant bought 850 bbl. of flour at $6 a barrel. He sold 600 bbl. at $7 a barrel and the remainder at $6.50 a barrel. What was his gain ?

1. 40 are how many tens?
2. ½ of 20 are how many tens?
3. 1½ times 40 are how many tens?
4. How many half-dozen in 36?
5. Is 80 an odd number or an even number?
6. What two numbers multiplied together make 80?
7. At 4¢ a pint what will a gallon of vinegar cost?
8. What is the cost of 5 yd. of tape at 2¢ a foot? At 2½¢?
9. How many cents in 4 dimes? In 2 dimes? In 1½ dimes?
10. How many dimes in a dollar? In a half-dollar? In a quarter-dollar?
11. How many days from the tenth of May to the first of June?
12. How many days from the 10th of April to the 1st of May?
13. How many days from the 1st of June to the 10th of July?
14.

½ of 48	¼ of 48	¾ of 48	⅓ of 48
⅔ of 48	⅖ of 48	⅘ of 48	⅕ of 48
⅜ of 48	⅝ of 48	⅛ of 48	⅞ of 48
⅘ of 48	⅙ of 48	⅚ of 48	⅔ of 48
⅚ of 48	⅝ of 48	⅝ of 48	⅞ of 48
¹⁄₁₂ of 48	¹⁄₁₂ of 48	¹⁄₁₂ of 48	¹⁄₁₂ of 48

15. How many weeks in 50 days?
16. How many weeks in 50 school-days?
17. 30 min. is what part of an hour? 15 min. is what part?
18. If you have a box 4 in. long, 3 in. wide, and 2 in. deep, how many inch cubical blocks can you put on the bottom of the box? How many layers can you put in the box? How many blocks can you put in?
19. I bought 9 yd. of ribbon for 63 cents. How much was it a yard?

1. A public library has a yearly circulation of 113,932 books. How many books are taken daily, if the library is open 313 days in a year?

2. A railroad 239 miles in length cost $1,750,436. What was the average cost a mile?

3. How many building lots at $321 each can be bought for $386,163?

4. A ship averaging 215 miles a day has to sail 7310 miles. How many days will it take for a trip?

5. If 69,646 tons of coal are required for 194 steamships, what is the average number of tons for each?

6. Divide $1600.50 equally among 15 men.

7. In 64 loads of coal there are 143,360 lb. What is the average weight of each load?

8. How many barrels of flour each containing 196 lb. can be filled from 18816 lb. of flour?

9. A farm of 168 acres was sold for $17,976. What was the price an acre?

10. A gallon contains 231 cu. in. How many gallons will a tank hold that contains 279,510 cu. in.?

11. There are 144 sq. in. in a square foot. How many square feet in a rectangular piece of land that contains 163,296 square inches?

12. There are 320 rd. in a mile. How many miles are there in 949,760 rods?

13. What is the quotient, when 29016 is divided by 372?

14. Divide 387,828 by 18, and this quotient by 27 and the last quotient by 42.

15. 175,120 rails were used in laying 398 miles of track. How many were required for each mile?

16. The product of two numbers is 22,217,328. One of them is 324. What is the other?

1. A farmer brought to a store $2.45 worth of eggs and $7.50 worth of butter. How much sugar at 5¢ a pound should he receive in exchange?

2. Six boys counted chestnuts they had gathered. The first had 182, the second 275, the third 341, the fourth 163, the fifth 378 and the sixth 245. If they should divide them equally, how many would each boy receive?

3. One boy has ⅓ of 765 marbles and another boy has ⅐ of 623 marbles. How many marbles have both together?

4. What is the average age of four girls, whose ages are respectively 14 yr., 10 yr., 11 yr., and 13 years?

5. A drover paid the following prices for 7 horses: $125, $135, $140, $150, $160, $110, $118. What was the average price of each horse?

6. A farmer had 234 sheep in one field, 176 in another and 166 in another. If he sold ⅓ of them how many sheep did he sell?

7. In a certain school the attendance was Monday 150, Tuesday 164, Wednesday 160, Thursday 152 and Friday 159. What was the average daily attendance?

8. A grain dealer sold some oats for $450, corn for $211 and rye for $125. He spent the whole sum in flour at $6 a barrel. How many barrels did he buy?

9. A baker has 344 oz. of flour in one barrel, 264 oz. in another, 472 oz. in another and 448 oz. in another. How many loaves of bread can he make, if each loaf weighs 8 ounces?

10. A gentleman divided among 19 boys the following sums of money: $181, $81, $265, $152, $347. How much did each boy receive?

11. A man paid $2604 for land at $31 an acre, and $676 for land at $52 an acre. How many acres of land did he buy in all?

1. If it takes ⅓ of a yard of ribbon for a loop, how many loops will ½ of a yard of ribbon make?

2. ⅓ equals how many tenths?

3. If you have a half of a quire of paper, how many sixths of a quire have you? How many twelfths of a quire?

4. In 5 pounds, how many thirds of a pound?

5. In three yards, how many sevenths of a yard?

6. If I buy ½ of a pound of one kind of candy, and ⅓ of a pound of another kind, how many eighths of a pound do I buy?

7. If I buy ½ of a yard of velvet, and then ⅓ of a yard, how many sixths of a yard do I buy?

8. Charles had $30, and spent ½ of it for a watch, and ⅒ of it for a pair of shoes. How many tenths did he spend? How many dollars did he spend?

9. How many yards is it ½ way round a flower bed which measures 15 ft. on each side, and 9 ft. on each end?

10. If a flower bed is ¼ of a rod on one side, and ⅓ of a rod on the other side, how many twelfths is it on both sides? How many thirds is it?

11. Into how many piles do I put 96 oranges, if I put a dozen in each pile?

12. A man made a fence across a garden that is 12 yards wide. If he put in posts 2 yards apart to support the railing, how many posts did he use, provided there was a post at each end?

13. How many square yards in a square that is three yards on a side?

14. 4 times 6 eights are how many whole ones?

15. 8 is ½ of what number? 50% of what number?

16. 6 is ⅓ of ——. 3⅓ is ⅓ of ——. 2½ is ¼ of ——.
8 is ½ of ——. 6 is ⅓ of ——. 4¼ is ½ of ——.
9 is ⅒ of ——. 4 is ⅓ of ——. 1½ is ⅓ of ——.

1. If I buy a farm of 75 acres for $7650 and sell it for $5775, what do I lose an acre?

2. If I buy 91 cows for $3276 and 686 sheep for $2744, how much more will a cow cost than a sheep?

3. From $1896 take away $312. Divide the remainder equally among three persons.

4. A manufacturer sold his mill that cost him $13,200 at a loss of $1630, and with the proceeds bought land at $65 an acre. How many acres did he buy?

5. A farmer sold 15 horses for $1770 and 34 cows for $1428. How much does the value of a horse exceed the value of a cow?

6. A man dug 1482 feet of ditch in 57 days and his companion dug 1392 feet in 48 days. How much more did one dig in a day than the other?

7. A dealer bought 67 head of cattle for $3618. 9 of them died and then he sold the remainder for $3712. How much did he gain on each one sold?

8. A city increased its population from 40,564 to 64,139 in 15 years. What is the average gain a year?

9. The minuend is 7646, the subtrahend 3758. What is one ninth of the remainder?

10. A man who owed $1236 gave in payment $948 and for the balance 8 cows. At what price were the cows valued?

11. Divide $1042 between Charles and Henry so as to give Charles $66 more than Henry.

12. A company of 25 men bought a manufactory for $145,650 and sold it for $130,850. What did each man lose?

13. A merchant had 40 yd. of cloth and sold 18 yd. If he then sold the rest for $14.30, what did he receive a yard?

14. An estate of $64,761 after paying expenses of $5883 was divided equally among 18 persons. What did each receive?

1. If 25 acres produce 8275 lb. of cotton what will 97 acres produce?

2. A farmer sold 54 acres of land at $126 an acre and took his pay in sheep at $7 each. How many sheep did it take?

3. How many cows worth $35 each will pay for 25 horses at $119 each?

4. If 42 men can do a piece of work in 36 days, in how many days will 56 men do it?

5. How many barrels of kerosene, each holding 42 gal., can be filled from 14 tanks each holding 1236 gal.?

6. If 875 bbl. of flour cost $5250, what will 236 bbl. cost?

7. If 36 bricklayers can lay 25,416 bricks in a day how many bricks will 89 men lay in the same time?

8. If 27 men can build a wall in 24 days, how many men can do it in 36 days?

9. A grocer put 38 bbl. of flour, each containing 196 lb. into sacks holding 49 lb. How many sacks did it take?

10. If a wheel revolves 9360 times in going 12 miles, how many times will it revolve in going 368 miles?

11. The cost of 17 yd. of carpet was $25.84. At the same rate, what would 9 rolls of 35 yd. each cost?

12. If 6 fields of 26 acres each cost $7020, what will 85 acres cost?

13. How many bushels of wheat at 96¢ a bushel will pay for 674 bu. of oats at 48¢ a bushel?

14. If a man can save $46 every month, in how many years of 12 mo. each can he save $7728?

15. If a steamship can sail 1505 miles in 7 days, in how many days can it sail 7525 miles?

16. I had 347 tons of hay and bought 435 tons. After using 161 tons I sold the remainder for $9315. What did I receive a ton?

1. If 1 man can earn $12 in 1 week, how many dollars can he earn in 2 weeks? In 5 weeks? In 2½ weeks? In 3 weeks?

2. If a man can earn $24 in 4 weeks, how much can he earn in 1 week? In 3 weeks? In 7 weeks?

3. If 6 oranges cost 18 cents, what will 4 oranges cost at the same price? 9 oranges? 11 oranges?

4. A horse that cost $100 was sold for $150. How many dollars was gained? What part of the cost was gained? What per cent was gained?

5. If goods that cost 75 cents a yard sell for 50 cents, how many cents are lost? What part of the cost is lost? What per cent is lost?

6. What is 25% of 8? 16? 24? 32?

7. What is 10% of 30? 50? 70? 90?

8. Find the cubic inches in a block 4 in. long, 3 in. thick, and 1 in. wide.

9. Find the cubic inches in a block 2 in. by 2 in. by 2 in.

10. Find the difference between 2 ft. square and 2 square ft.

11. How many days in 7 wk. and 3 days?

12. If you had ⅓ of a dollar and should earn ⅓ of a dollar, what part of a dollar would you then have?

13. $12 + 6 = ?$ $12 - 6 = ?$ $12 \times 6 = ?$ $12 \div 6 = ?$

14. $12 + 3 = ?$ $12 - 3 = ?$ $12 \times 3 = ?$ $12 \div 3 = ?$

15. $12 + 4 = ?$ $12 - 4 = ?$ $12 \times 4 = ?$ $12 \div 4 = ?$

16. $9 + 7 = ?$ $9 - 7 = ?$ $9 \times 7 = ?$ $9 \div 7 = ?$

17. $9 + 9 = ?$ $9 - 9 = ?$ $9 \times 9 = ?$ $9 \div 9 = ?$

18. 6 times 12 and ¼ of 12 = ?

19. 8×7 and ⅐ of 7 = ?

20. 9×4 and ¾ of 4 = ?

21. ⅓ of 48 is what number?

22. 6 times ⅓ of 15 are how many?

23. ⅓ of Will's age is 2½ years. How old is he?

1. A man traveled 25 miles an hour for 15 hours and 27 miles an hour for twelve hours. How much farther must he go to travel 850 miles?

2. A grain dealer had 748 bu. of wheat and bought 19 car loads of 245 bu. each. He then sold 2345 bu. How many bushels had he left?

3. A farmer bought a farm for $2340 and gave in payment 46 cows at $36 each and 2 horses at $125 each. How much does he still owe on the farm?

4. If I buy 27 cows at $32 each and 57 cows at $38 each, and sell them all for $2475, do I gain or lose, and how much?

5. A jeweler sold 9 silver watches at $19 each and a gold watch for $95. If they all cost him $184, what was his profit?

6. A field of 29 acres was sold at $67 an acre and another field of 17 acres was sold at $76 an acre. For what did both fields sell?

7. A city built a High School building for $240,000 and an engine house for $87,000. It paid $65,000 down and the remainder in 8 annual payments. What was the yearly payment?

8. The income of a clerk was $1500 a year. If he spent $300 for rent, and $768 for other expenses and saved the rest, how much did he save a month?

9. A farmer sold 184 bbl. of potatoes at $3 a barrel and 284 bbl. of apples at $2 a barrel. If he received his pay in cows at $35 each, how many cows did he receive?

10. If 6 houses cost $14,700, how many such houses can be bought for $22,050?

11. A man bought 9 bbl. of molasses for $405 and sold it so as to make $15 on a barrel. For how much did he sell a barrel?

12. How much less than $175 will 25 bbl. of flour cost at $6.75 a barrel?

1. If 33 pickets are used in building one rod of fence, how many pickets will be needed for a fence round a lot 22 rd. long and 16 rd. wide?

2. A soap maker had 24 lots of soap each containing 325 bars. How many boxes holding 40 bars each will it take to hold all the soap?

3. A man began business with $7148. At the end of 7 years he was worth $22128. What was his yearly gain?

4. A merchant deposited $2478 in a bank at one time, and at another time $5176. If he then drew out $3785, how much remained in the bank?

5. A farmer received $385 for his wheat, $265 for his corn and $176 for his potatoes. He paid $358 for labor and $196 for other expenses. How much did he save?

6. A drover bought 46 cows at $27 each, 78 sheep at $9 each and 17 horses at $118. He sold them all for $4116. How much did he gain?

7. A's farm cost $5742, which was $1786 more than the cost of B's farm. Find the cost of both farms.

8. A man owns three houses. The first cost $2450, the second twice as much as the first and the third as much as the first and second together. Find the cost of all three houses.

9. If 16 men earn $560 a week, how much will 49 men earn in the same time and at the same rate?

10. A man bought 16 horses for $1632. He sold 12 of them at cost. What did he receive for those he sold?

11. A lady had $278 in her pocket-book. While out shopping she spent $86.50 at one store and $35.75 at another. How much had she left?

12. I bought a horse for $135 and kept it four months at an expense of $36.50. I then sold it for $215. How much did I gain?

1. If a man spends $28 in a month, what does he spend in a week?

2. If a man spends $21 in a week, what does he spend in a day?

3. If you give 5 cents for a gill of varnish, what would you give for a pint? A quart? A gallon?

4. 4 is ⅔ of what number?

5. 8 is ⅖ of what number?

6. 15 is ⅝ of what number? 20 is ⅝ of what number?

7. 2⅔ is ⅓ of what number? 4⅔ is ½ of what number?

8. 6⅔ is ⅓ of what number?

9. How can you divide 5 oranges equally among 3 persons?

10. If 4 yd. of cloth cost $2, what is that a yard?

11. A man sold a watch for $63, which was ⅞ of what it cost him. How much did he gain?

12. A man paid out $4, which was ⅖ of all the money he had. How much money had he?

13. If ⅔ of a pound of coffee cost 24 cents, how much will a pound cost? How many pints of peanuts, at 6¢ a pint, can be bought for the price of a pound of coffee?

14. 24 is ⅔ of how many?

15. If 2 men can do a piece of work in 6 days, how long will it take 4 men?

16. If 5 oranges cost 25¢, what will 3 oranges cost?

17. If 4 yd. of cloth cost $12, what will 2 yd. cost?

18. 24 is ⅝ of what number?

19. Mrs. Smith took 3½ doz. eggs to the store, and sold them for 20 cents a dozen. With the proceeds she bought as many pounds of sugar at 6¢ a pound as she could buy, and brought the rest of her money home. How much did she bring home?

20. 7⅓ is ⅓ of what number?

16 ounces 1 pound.
2000 pounds 1 ton (T.).

1. How many ounces in 8 lb. 7 oz.?
2. How many ounces in $\frac{4}{5}$ of a ton?
3. Change 3 T. 216 lb. 7 oz. to ounces.
4. Change 1 T. 425 lb. 12 oz. to ounces.

In dividing by 2000 to change pounds to tons, first divide by 1000, by moving the point to the left, and then divide by 2.

Change 7897 lb. to tons.   3 tons.

$$2 \overline{)\ 7.897} \qquad\qquad 2000 \overline{)\ 7897}$$
$$\overline{3.9485} \qquad\qquad\quad \underline{6000}$$
$$\qquad\qquad\qquad\qquad\qquad 1897 \text{ lb.}$$

5. Change 117309 oz. to pounds.   Change your pounds to tons.
6. Change 1375 lb. 14 oz. to ounces.
7. Change 65784 ounces to pounds and tons.
8. Change 4 T. 75 lb. 6 oz. to ounces.
9. Change 7 T. 86 lb. 8 oz. to ounces.
10. Change 1400 pounds to ounces.
11. What is the cost of 256 oz. of sugar at 9¢ a pound?
12. How many tons in 12640 lb.?
13. Reduce 6 T. 1314 lb. to pounds.
14. Reduce 64052 lb. to tons.
15. Change 3206 oz. to pounds.
16. Change 11 T. 1700 lb. 6 oz. to ounces.
17. How many pounds in 642 ounces?
18. What will 18000 lb. of hay cost at $15 a ton?
19. How many pounds are there in 5 T. 1675 lb.?
20. How many ounces in 6 T. 83 lb. 13 oz.?
21. Change 7 T. 918 lb. to pounds.
22. How many boxes, each containing 12 lb., can be filled from a hogshead containing 960 lb. of sugar?

1. A trader sold a house and lot for $5986, at a loss of $1954. How much did the house cost?

2. Add:

$81.50	$76.67	$98.55	$49.87
9.07	9.72	17.00	56.08
56.27	37.29	45.62	29.78
4.25	8.50	78.29	9.43
2.62	23.42	77.75	90.08
19.75	8.93	56.33	79.65
8.37	86.75	7.87	94.37
16.62	5.87	78.89	8.58

3. Bought a horse for $160, and sold it for $145.75. How much was lost?

4. If 276 men can build a wall in 137 days, how long will it take one man?

5. How much must I pay for a farm of 112.8 acres, if the price an acre is $37.50?

6. How many feet in 1287 rods?

7. A clerk's salary is $55 a month, and he pays $22 a month for board, and $9.50 a month for other expenses. How much does he save in 1 month? In 8 months?

8. Divide 2813 by 29.   **9.** Divide 3528 by 42.

10. If 56 lb. make a bushel of shelled corn, how many bushels in a load weighing 1792 lb.?

11. A has 715 sheep, and B 8 times as many lacking 191¼. How many sheep has B?

12. Make an example to illustrate "Several numbers given, to find their sum."

13. Reduce to improper fractions: 9⅝, 3⅞, 6⅞, 9¼, 7⅝.

14. A farmer had 4 fields containing 56¼ acres, 39 7/16 acres, 28⅝ acres, and 47¾ acres. How many acres did he own? If he should sell 19⅝ acres at one time and 28¾ acres at another, how many acres would he have left?

Find the cost of the following:—

1. 3 lb. pork @ 15¢.	**11.** 6 lb. butter @ 40¢.
2. 4 lb. sugar @ 6¢.	**12.** 8 lb. coffee @ 30¢.
3. 2 bu. potatoes @ 60¢.	**13.** 12 lb. fish @ 8¢.
4. ½ bu. corn @ 90¢.	**14.** 2 bu. corn @ 90¢.
5. 6¼ lb. rice @ 8¢.	**15.** 3½ doz. eggs @ 20¢.
6. 1½ lb. starch @ 16¢.	**16.** 10 lb. sugar @ 6¢.
7. 9 yd. calico @ 9¢.	**17.** 20 yd. ribbon @ 25¢.
8. 2 lb. cheese @ 14¢.	**18.** 3 qt. oil @ 20¢ a gallon.
9. ⅔ doz. oranges @ 30¢.	**19.** 5 gal. kerosene @ 9¢.
10. 18 yd. calico @ 33⅓¢ .	**20.** 50 bu. potatoes @ 50¢.

21. Multiply 286.08 by 100.

22. Multiply 1000 by .01.   By .1.

23. Multiply 4000 by .4.   By .06.

24. Change to their smallest terms:

$\frac{2}{8}$, $\frac{4}{8}$, $\frac{6}{12}$, $\frac{3}{12}$, $\frac{6}{12}$, $\frac{2}{10}$, $\frac{5}{10}$, $\frac{3}{15}$, $\frac{6}{15}$, $\frac{4}{16}$.

25. Change to their smallest terms:

$\frac{6}{8}$, $\frac{9}{12}$, $\frac{12}{9}$, $\frac{9}{12}$, $\frac{9}{15}$, $\frac{12}{8}$, $\frac{9}{15}$, $\frac{6}{15}$, $\frac{18}{16}$, $\frac{12}{8}$.

26. Change to 16ths:

½,   ¼,   ¾,   ⅛,   ⅜,   ⅝,   ⅞,   1,   2½,   3⅛.

27. Change ⅔ to equivalent fractions, having for denominators: 9,   12,   15,   27,   30,   36,   24,   18.

28. Add: ⅔ and $\frac{7}{16}$ $\frac{11}{12}$ and ⅞ $\frac{7}{24}$ and ⅝ $\frac{11}{12}$ and ⅝
         $\frac{7}{12}$ and ⅘   ¾ and $\frac{5}{12}$ $\frac{7}{15}$ and ⅔ $\frac{11}{12}$ and ⅔

29. Multiply:

½ by 3	$\frac{9}{10}$ by 5	⅔ by 3	$\frac{5}{12}$ by 6
¾ by 4	$\frac{11}{12}$ by 5	⅞ by 4	1⅝ by 2
⅝ by 3	1⅛ by 3	⅞ by 3	⅘ by 4

30. Multiply:

$\frac{11}{12}$ by 6	$\frac{11}{12}$ by 6	⅝ by 8	$\frac{5}{16}$ by 9
⅞ by 9	$\frac{4}{9}$ by 7	$\frac{3}{10}$ by 5	1⅛ by 8
1⅛ by 6	½ by 8	¾ by 8	⅝ by 8

To Divide a Decimal by a Decimal.

1. Divide 24 by 4.

2. Multiply both divisor and dividend by 10, and then divide.

3. Multiply both divisor and dividend by 100, and then divide.

4. How do your quotients compare in the three examples ?

5. What effect on the quotient if you multiply both divison and dividend by the same number ?

Divide 2.44 by .4.

$$.4 \,)\, \overline{2.44}$$
$$4 \,)\, \overline{24.4}$$
$$\overline{6.1}$$

Since multiplying both divisor and dividend by the same number does not affect the quotient, we multiply both by 10. We are now to divide 24.4 by 4. 4 is contained in 24 units 6 units times. 4 is contained in.4 tenths 1 tenth times.

LEARN. — Always multiply both dividend and divisor by that number which will change the divisor to a whole number, then divide as in whole numbers.

6. 6.48 by .6   .36 by .09   12.8 by 1.6   9.52 by .7
    9.08 by .2   .49 by .7   300 by .06   6.75 by .15
    1.44 by .06   .96 by .08   7.2 by 1.2   9.52 by 4.76
    8.28 by .4   6.4 by .08   14.4 by 1.2   3.24 by .09

7. 144 by .12 25.6 by 1.6   .8 by 1.6   412.5 by .33
   10.8 by .09 17.28 by 1.44   7.2 by 120   5.20 by .65
   12.6 by .21   8.4 by .14   17.50 by .25   2.70 by .03
    3.05 by .5   18.06 by .06 180.6 by .06   4.64 by .04

8. 3.3 by .2   1.23 by .5   3.06 by .09   5.4 by .18
    8.07 by .02 70.2 by .09   10 by .05   1.60 by .8
    1.8 by .20 60.4 by .08   18.03 by .03   14 by .07
   71.05 by .07   .6 by .12   3 by 1.2   8.48 by .04
   40.8 by 1.6   .05 by .25   1.08 by 1.2   9.60 by 3.2

1. A man bought 3 tons of hay at $18.50 a ton, 12 bbl. of apples at $2.50 a bbl., and a suit of clothes for $50. In payment he gave 17 bbl. of flour at $5.75 a bbl., and the balance in money. How much money did he give?

2. If the number of pages in a book is 178, and the average number of words on a page is 307, how many words are there in the book?

3. Nellie is trying to earn money enough picking berries to buy a writing-desk that costs $3.87. If she sells her berries at 9¢ a quart, how many quarts must she pick?

4. How many yards of cloth at 9¢ a yard, can be bought for $486?

5. Add:

9.7	8.9	2.2	6.8	1.6	6.4
1.6	6.1	3.4	3.3	1.0	7.9
3.8	5.0	9.9	6.7	2.3	7.2
6.1	3.7	9.3	8.0	6.1	6.2
0.5	1.1	7.6	6.1	6.8	7.9
1.8	8.2	9.1	0.8	1.5	3.2

6. Subtract:

16.8	8.4	169.5	98.4	6.2	8.0
9.7	6.7	83.7	89.5	1.7	1.6

7. Multiply:

.6 by .17	.9 by .84	1.9 by 8.64	.8 by .04
1.8 by .14	.9 by 1.01	6 by .06	.8 by .08

8. If a man walks 3.75 miles in an hour, how far can he walk in 6.3 hours?

9. What must I pay for 3.6 feet of land at $0.37 a foot?

10. Divide 6.51 by 7.

11. Divide 4.18 by 4.

12. If 3 pk. of berries cost $2.88, what will a quart cost?

1. How many square yards in the floor of your schoolroom?

2. If you have 720 in. of wire, into how many foot pieces can you cut it?

3. How many yards of wire fencing will it take to reach round my rectangular flower garden, 8 yd. by 3 yd.?

4. I cut 12 in. from a piece of ribbon 1 yd. long. How many feet in the piece that is left?

5. A strip of oilcloth is 3 ft. 8 in. long. How many inches long is it?

How many:

6. Inches in 1 ft.? 2 ft.? 4 ft.?

7. Feet in 1 yd.? 3 yd.? 5 yd.?

8. Inches in 1 yd.? ½ yd.? ¼ yd.?

9. Feet in 12 in.? 36 in.? 60 in.?

10. Yards in 3 ft.? 9 ft.? 15 ft.?

11. Yards in 36 in.? 18 in.? 9 in.?

12. Yards in 1 rod? 2 rd.? 3 rd.?

13. Feet in 1 rd.? 2 rd.? 3 rd.?

14. Rods in 1 mi.? ½ mi.? ¼ mi.?

15. A box contains sixty oranges. How many dozen? They sold for 5¢ a half-dozen. How much was received for all?

16. Out of every dozen lemons 2 have spoiled. How many have spoiled out of 72 lemons?

•17. How many sheets of paper are there in ½ quire? ⅓ quire? ¼ quire? ⅛ quire?

18. If you had 64 pints of currants, how many quarts would you have? How many peck baskets could you fill?

19. How many pecks of beans in 56 quarts?

20. I had 1 bu. of apples. I sold 8 quarts. How many pecks remained?

21. Fannie bought a pound of sugar, but on her way home spilled ¼ of it. How many ounces had she left?

1. A merchant bought at one time 224 bbl. of flour for $1344; at another 217 bbl. for $1193.50; at another 192 bbl. for $1056; at another 486 bbl. for $2916. How many barrels did he buy? What was the cost of all?

2. If a railway train runs 42 miles an hour, how many miles will it run in 678 hours?

3. A farmer sold his wheat at 97¢ a bushel, receiving $351.14. How many bushels did he sell?

4. If 63 books cost $126, what will 125 books cost?

5. If 24 men can dig a ditch in 18 days, how many days will it take 1 man? How many men will it take to dig it in 27 days?

6. Multiply $10\frac{3}{11}$ by 33.

7. Multiply 45 by $\frac{1}{4}\frac{3}{4}$.

8. If 97 books cost $317.19, what does each book cost?

9. What is the cost of 480 pounds of tea at $62\frac{1}{2}$ cents a pound?

10. What is the cost of 2480 articles at 75¢ each?

11. If 22 bbl. of flour cost $143.00, what is the price of a barrel?

12. How many square rods in a rectangular field 40 rods wide and 92 rods long?

13. How many square ft. in the walls and ceiling of a room 36 ft., by 48 ft., and 12 ft. high?

14. Reduce 3 gal. 3 qt. 1 pt. 2 gi. to gills.

15. Reduce 17 bu. 3 pk. 5 qt. 1 pt. to pints.

16. If 50 bu. of corn cost $20 what will 600 bu. cost?

17. If I lose $21 on an article that cost $63, what part do I lose? What per cent do I lose?

18. Find 75% of 440 sheep.

19. How many cubic feet of water are there in a rectangular cistern, whose bottom is 8 ft. on a side, if the water is 12 ft. deep?

1. If 35 yd. of cloth cost $140, how much will 95 yd. of the same cloth cost?

2. How many square inches in the top of a table 2 ft. square?

3. I have 4 bins containing 66 bu., 47 bu., 95 bu., and 36 bu. of corn. If 1 bu. of corn weighs 60 lb., how many pounds of corn have I?

4. At $45 a head, how many cows can I buy for $1035?

5. Divide $3600 among 3 persons. Give the first ⅓ of it, the second ¼ of it, and the third the rest.

6. How many miles does a swallow fly in 2 hours, if it flies 280 rods a minute?

7. What will 1 pk. of grass seed cost if 14 bu. cost $43.12?

8. What is the cost of 65 firkins of butter at 28¢ a pound, 56 lb. to a firkin?

9. If 8 pairs of fur gloves cost $56, how many pairs of the same kind of gloves can you get for $161?

10. What is the cost of 6½ bu. of potatoes at 25¢ a peck?

11. Find the cost of 5 lb. 8 oz. of tea at 60¢ a pound?

12. My dining room is 18 ft. by 20 ft. A mat covering the center of the room is 16 ft. by 18 ft. How many square feet of the floor is covered? Is uncovered?

13. If the fare to New York is $5.75, how much money ought the railroad company to receive from a train of 9 cars, each carrying 42 passengers?

14. A dairyman made 377 lb. of butter in May, 417 lb. in June, 386 lb. in July, 295 lb. in August. How many tubs, each holding 25 lb., will hold it?

15. How many years will it take a man to save $1944, if he saves $27 a month?

16. If 23 tons of coal cost $115, how many tons can be bought for $145?

17. What must I pay for 18 pk. 3 qt. of onions at 48¢ a peck?

1. Give sums:

57 + 16	49 + 18	67 + 27	75 + 14	58 + 18
13 + 78	17 + 43	14 + 36	18 + 56	17 + 45
25 + 17	66 + 14	16 + 26	48 + 12	34 + 19
18 + 25	14 + 17	12 + 31	27 + 16	17 + 27

2. Give differences:

66 − 17	31 − 25	85 − 50	67 − 18	42 − 29
54 − 36	87 − 19	50 − 14	45 − 36	36 − 12
60 − 15	66 − 48	84 − 56	37 − 14	81 − 58
46 − 37	75 − 15	70 − 18	74 − 57	83 − 28

3. Give products:

14 × 4	6 × 15	14 × 6	8 × 71	17 × 4
18 × 6	3 × 19	21 × 7	6 × 13	16 × 6
24 × 4	5 × 15	70 × 7	6 × 15	13 × 6
15 × 2	4 × 21	12 × 8	5 × 17	15 × 4

4. Give quotients:

45 ÷ 3	42 ÷ 7	76 ÷ 4	60 ÷ 4	108 ÷ 6
98 ÷ 7	75 ÷ 5	112 ÷ 7	92 ÷ 4	96 ÷ 4
56 ÷ 8	98 ÷ 2	70 ÷ 5	78 ÷ 3	91 ÷ 7
90 ÷ 6	80 ÷ 5	48 ÷ 3	56 ÷ 4	144 ÷ 9

5. Give remainders:

$24\frac{3}{4} - 4\frac{1}{4}$	$60 - \frac{1}{2}$	$40 - \frac{1}{4}$	$16 - \frac{1}{2}$
$50 - 2\frac{1}{2}$	$40 - 5\frac{3}{4}$	$30 - 2\frac{1}{2}$	$22 - 1\frac{3}{4}$
$4\frac{3}{4} - 2\frac{3}{8}$	$6\frac{1}{2} - 1\frac{1}{4}$	$7\frac{1}{2} - 1\frac{1}{3}$	$8\frac{1}{3} - 6\frac{3}{8}$
$11\frac{3}{4} - 7\frac{1}{2}$	$24 - 1\frac{1}{4}$	$21 - 10\frac{1}{2}$	$9\frac{5}{8} - 1\frac{2}{3}$

6. $46 + 20 + 30 - 10 - 30 + 40 + 10 - 80 + 40 - 50.$
$82 - 40 - 30 + 50 + 20 - 40 - 10 + 20 + 30 - 40.$
$49 + 30 - 20 + 40 - 50 + 60 - 40 - 10 + 30 + 20.$
$15 + 20 + 30 - 40 + 50 - 20 + 30 - 60 - 10 + 60.$
$42 - 30 + 60 - 30 - 30 + 50 + 30 - 40 - 30 + 20.$

1. Divide 5208 by 21.

2. Divide 4991 by 31.

3. Multiply 8653 by 467.

4. Add 7846, 8463, 4635, 3879, 6387, 4365, 3657, 6578, 5474, 8547, 8639, 5786, 7896.

5. A man sold land for $45 an acre, receiving $7200 for it. How many acres did he sell? How much would he have received if he had sold it at $52 an acre?

6. To help a poor family, two little girls made 10 pounds of candy, and sold it for 3¢ an ounce. How much money can they give to the family?

7. How many square yards are there in a rectangular field 48 yd. long, and 75 ft. wide? 75 ft. are how many yards?

8. Find the number of square inches in the surface of a box 24 in. long, 18 in. wide, and 12 in. high.

9. Find the number of cubic inches in this box.

In the next four examples, and all others like them, first perform the operations indicated within the parentheses, remembering that within a parenthesis, as without, the signs of multiplication and division are to be used first.

10. $84 - (81 \div 9) \times 7 = ?$

11. $120 \div 6 + 30 - 6 \times 4 = ?$

12. $(8 \times 5 \times 6 - 180 \div 3) \div 9 = ?$

13. $(9 \times 12 - 7 \times 8) + 105 \div 5 = ?$

14. Change 4 rd. 12 ft. to inches.

15. How many cubic feet of water will a rectangular cistern hold that is 36 ft. long, 18 ft. wide, and 9 ft. deep?

16. A farmer sold his wheat for $687, and his potatoes for 3 times as much. How much did he receive for both?

17. How many cubic feet of air are there in a room 14 ft. square, and 9 ft. high?

18. From $84\frac{1}{3}$ take $52\frac{1}{2}$. From $24\frac{1}{8}$ take $9\frac{1}{2}$.

1. What remains of 26⅔ bu. after taking out 12₁₀ bu.?

2. How many feet in 1 mile or 320 rods?

3. Multiply 212 by 26¼.

4. Multiply 728 by 35¼.

5. How far is it round a rectangular park 174 ft. long and 96 ft. wide?

6. A wire fence costs 4½ cents a foot. What must I pay for enough to fence a square field 200 ft. long?

7. How many cubic inches in a rectangular box 10 in. long, 8 in. wide, and 4 in. deep?

8. If I have a pile of inch cubes 8 in. long and 4 in. wide, how high must I make the pile to use 96 cubes?

9. Mr. Jones paid $1750 for a lot of land. He built a house that cost $3215.50 more than the lot, and a barn that cost $374.58 less than the lot. Find the cost of all?

10. At $3.00 each, what is the largest number of hats that can be bought for $50, and how much money will be left?

11. At $0.32 for a can of soup, how many cans will $23.36 buy?

12. If 70 horses are sold for $15,400, what is the average price of one?

13. A steamer runs 576 miles in 24 hours. How far will she run in 245 hours?

14. $234.69	**15.** $394.49	**16.** $345.16	**17.** $400.00
576.83	873.62	864.73	789.86
58.98	508.77	25.49	458.45
4.67	564.53	7.85	634.25
.32	88.99	18.64	498.98
.07	5.64	240.59	96.57
5.10	38.40	34.67	237.80
32.78	527.80	678.45	649.86
47.76	60.74	16.88	543.16

1.
15 × 100	65 × 100	98 × 100	23 × 100
34 × 100	67 × 100	78 × 100	61 × 100
29 × 100	41 × 100	72 × 100	96 × 100
45 × 100	79 × 100	89 × 100	92 × 100

2. A woman buys 3 lb. of butter at 30¢ a pound, and gives the grocer a 50-cent piece. How much more must she pay?

3. A man owns a farm of $\frac{3}{4}$ of 80 acres. How much has he left after selling 40 acres?

4. What is the cost of 4 pieces of silk, 20 yd. in a piece, at 50 ct. a yard?

5. A girl had 80 cents. She bought a doll for 40 cents, and spent the rest for candy at 20¢ a pound. How many pounds did she buy?

6. If sugar costs 4¢ a pound, what is the cost of 21 pounds?

7. If vinegar is 20¢ a gallon, how many quarts can I get for 15 cents?

8. Make problems for each of the following:
$\frac{3}{4}$ × 64	63 ÷ 7	8 × 9	100 − 36
8 × $6\frac{1}{2}$	72 ÷ 8	9 × 6	15 + 18

9. What is the cost of 16 lb. of meat at 25¢ a pound?

10. What is the cost of 30 doz. lemons at $33\frac{1}{3}$ ¢ a dozen?

11. What is the cost of 400 yd. of velvet at 50¢ a yard?

12. If a man receives $800 for 4 horses, sold at the same price, how much does he receive for 1 horse?

13. Add 5 ft. 6 in. and 3 ft. 6 in.

14. If meat costs 16¢ a pound, what is the cost of 1 pound 7 ounces?

15. What is the cost of four pairs of shoes at 3\frac{1}{2}$ a pair?

16. If tea costs 80 cents a pound, how much does a pound and three-quarters cost?

17.
$1\frac{1}{2} + \frac{1}{2}$.	$1\frac{1}{2} + 2\frac{1}{2}$.	$1\frac{3}{4} + \frac{1}{4}$.	$2\frac{1}{4} + 3\frac{1}{2}$.
$1\frac{1}{2} + 1\frac{1}{4}$.	$2\frac{1}{2} + 2\frac{1}{2}$.	$3\frac{1}{2} + 1\frac{1}{4}$.	$3\frac{1}{4} + 3\frac{1}{2}$.

1. Draw a square 1 foot on a side, and divide it into square inches. How many square inches in one row? How many rows? How many square inches then in the square? How many square inches in a square foot?

2. Draw a square 1 yard on a side, and divide it into square feet. How many square feet in one row? How many rows? How many square feet in the square? How many square feet in a square yard?

3. Using a scale of 2 in. to a yard, draw a square 1 rod on a side. Divide it into square yards. How many rows have you? How many squares in a row? How many square yards have you? How many square yards in a square rod?

4. Copy and learn this table.

144 square inches (sq. in.)	= 1 square foot (sq. ft.)
9 square feet	= 1 square yard (sq. yd.)
30¼ square yards	= 1 square rod (sq. rd.)
160 square rods	= 1 acre (A.)

5. How many square inches in 8 sq. ft.?

6. How many square feet in 1728 sq. in.?

7. How many square yards in 81 sq. ft.?

8. How many square feet in 16 sq. rd.?

9. How many square rods in 4 acres?

10. How many square rods in 5 A. 120 sq. rd.? In 6 acres?

11. How many square rods in ½ an acre?

12. Find the area in square rods of a rectangular piece of land 80 rd. long and 2 rd. wide. How many acres are there?

13. How many acres are there in a rectangular plot of land 32 rd. long and 10 rd. wide?

14. Why are there 144 square inches in a square foot? Why are there 9 square feet in a square yard? Why 30¼ square yards in a square rod?

15. Change 4 sq. rd. to square yards. Change your square yards to square feet. Change your square feet to square inches.

1. A merchant had 936 yd. of muslin, and sold ⅝ of it.

2. Mrs. Jones bought 18⅔ yd. of picture wire. After hanging her pictures she had 7 ft. left.

3. By selling a lot for $600, I lost $200.

4. Last year to heat the schoolhouse we burned 98 tons of coal. It cost $6.25 a ton.

5. A farmer sold 48 doz. eggs at 25¢ a dozen.

6. Goods that cost $592 were sold at a loss of $116.18.

7. I paid $110.40 for butter at 23¢ a pound.

8. A grocer put up 10 lb. of tea into 4 oz. packages.

9. A suit of clothes cost a merchant $12. He sold it for 25% more than the cost.

10. I bought 6⅔ lb. of meat at 18¢ a pound.

11. A room is 13⅔ ft. long and 10⅓ ft. wide.

12. In a certain room there are two windows. In each window there are 4 panes of glass. Each pane is 28 inches long and 14 inches wide.

13. An oblong 1 ft. long and 8 in. wide was cut into 4-inch squares.

14. A field 64 rd. long and 10 rd. wide was sold at the rate of $75 an acre.

15. A fence is 56 feet long. The posts are 8 ft. apart.

16. A man bought 1½ acres of land and divided it into lots 8 rd. long and 3 rd. wide.

17. A train ran for 30 min. at the rate of 2 miles in 3 minutes.

18. A man left ⅓ of his property to his wife, and the remainder, $1000, to his son.

19. A bought 266 sheep at $5 a head. He sold ⅔ of them at $6, and the remainder at $4 a head.

20. A man paid $236 for a carriage, and 4 times as much for a pair of horses.

1. George had 75 apples, and gave away 20% of them. How many had he left?

2. A grocer lost $100 on a cargo of fruit, which was 50% of the cost. Find the cost.

3. If 6 oranges cost 24 cents, what will eight oranges cost at the same rate?

4. If 9 pears cost 27 cents, what will 12 pears cost at the same rate?

5. If 3 bbl. of flour are worth $18, what are 7 bbl. worth? 70 bbl.?

6. If 6 tubs of butter cost $42, what will 4 tubs cost? 40 tubs?

7. If 8 yd. of silk cost $32, what will 9 yd. cost?

8. If 9 bbl. of cider cost $45, what will 4 bbl. cost?

9. How much will 60 caps cost at $33\frac{1}{3}$¢ each?

10. At $33\frac{1}{3}$¢ a gallon, what will 150 gallons of molasses cost?

11. A boy bought a bicycle for $15, and sold it at $33\frac{1}{3}$% above cost. What did he get for it?

12. If a newsboy buys papers at 2¢ each, and sells them at 3¢, what per cent of profit does he make?

13. If a boy buys papers at 1¢ each, and sells them at 2¢, what per cent of profit does he make?

14. What will my board amount to in 12 weeks, if I pay at the rate of $35 for 7 weeks?

15. If 4 men can do a piece of work in 6 days, how long will it take 8 men to do the same work?

16. How many cubic feet are there in a rectangular block of granite 4 ft. long, 3 ft. wide, and 2 ft. thick?

17. How many square rods in a garden 4 rd. long and 3 rd. wide?

18. If 10 bbl. of beef cost $70, what will 8 bbl. cost?

1. $932 - (268 - 8 \times 8) + (240 \div 6) \times 7 - 27 \times 8.$

2. Find the number of cubic inches in a rectangular block 2 ft. long, 1 ft. wide, and 9 in. thick.

3. Add 46, 728, 437, 873, 6398, 4765, 758, 945.

4. Multiply 564 by 897.

5. From $735 subtract $287.32.

6. If ¾ of a pound of tea cost 72 cents, how much is the tea a pound?

7. Reduce 742 dry quarts to higher denominations.

8. If 34 yd. of silk cost $59.50, how many yards can be bought for $154?

9. A man lost $754 on a farm which he sold for $6225. How much would he have received for it if in selling he had gained $575?

10. Divide 16820 by 29.

11. What sum of money added to $675 will make $1234.64?

12. How many gallons of molasses worth 10¢ a quart can you buy for $1.20?

13. Harry has 126 marbles, which is 49 less than his brother has. How many have both?

14. At 5¢ a square foot, how much will 68 boards cost, if each board is 16 ft. long and 1 ft. wide?

15. If 8 lb. of sugar cost 48 cents, what must you pay for 2718 lb.?

16. At $16 a ton, how many tons of hay cost $720?

17. Divide 5100516 by 569.

18. Multiply 7684 by 460.

19. Divide 10248 by 61.

20. How many sheets of paper are there in 248 quires?

21. Find the cost of one, when I pay $2.94 for 14 lb. of coffee, $33 for 15 hats, $325 for 13 sofas, $330.00 for 300 yd. of carpet.

1. Find the area of these right-angled triangles, first changing the dimensions so that they shall be alike:

Base 10 yd., altitude 27 ft.

Base 15 in., altitude 4 ft.

Base 36 in., altitude 2 yd.

Base 2 ft. 6 in., altitude 4 ft.

Base 3 yd. 1 ft., altitude 5 ft.

Base 96 yd., altitude 15 ft.

Base 1 rd., altitude 8 ft.

Make diagrams for each of the following examples:

2. A rectangular lot is 50 ft. by 75 ft. The house on the lot is 25 ft. by 50 ft. How many square feet are there in the yard?

3. How many square yards are there in the floor of a room 24 ft. by 18 ft. ?

4. How many square feet are there in the floor of the same room?

5. If this same room is 12 ft. high, how many square feet are there in the four walls?

6. If a building lot is 100 ft. square, and a house is built on it that is 30 ft. by 60 ft., with an L part 15 ft. square, how many square feet are covered by the building, and how many square feet remain for the yard?

7. Measure a crayon box, omitting fractions of an inch, and find the square inches in its outer surface.

8. Measure your schoolroom, omitting fractions of a foot, and find the number of square feet in its entire surface.

9. Measure your schoolyard, omitting fractions of a yard, and find the number of square yards in it.

10. A picture measured outside the frame is 39 in. long and 27 in. wide. If the frame is 3 inches wide, what is the distance round the picture inside the frame?

1. James receives $8 a week, and his sister ¾ as much. How much do both receive in a week?

2. A girl has to practice an hour a day. If she practices 20 min. before school, 20 min. at noon, how many minutes must she practice after school?

3. If George earns $42 in 7 weeks, how long will it take him to earn $72?

4. I have an album which has 20 pages, and 4 pictures on a page. How many pictures does it hold?

5. I bought a pound of maple sugar, but have given away 12 oz. How many ounces have I left?

6. Henry measured a room with a yard stick, and found it to be 5½ times the length of the stick. How many feet long is the room?

7. If in shipping 6 doz. eggs, 1½ doz. are broken, how many eggs are not broken?

8. If 6 peaches fill a quart measure, how many of the same size will fill a peck measure?

9. How many pints in ¼ of a gallon? In ½ of a gallon?

10. What is ⅓ of my age if ⅓ of it is 6 years?

11. If ½ of my money is $12, what is 1/12 of it?

12. How many inch cubes can be laid together, side by side, on a square foot of surface? How many layers could you put on top of this to equal 1 foot in height? What form would you have?

13. How many cents in ½ of a dollar? In ¼ of a dollar? In ⅕ of a dollar? In ¾ of a dollar?

14. What per cent of anything is ½ of it? ¼ of it? ⅕ of it? ¾ of it?

15. What part of a dollar is 50 cents? 25 cents? 20 cents? 75 cents?

16. What part of anything is 50% of it? 25% of it? 20%? 75%?

17. How long will it take to earn $2 at $⅓ a day?

1. What is 25% of 960 miles?

2. What is 33⅓% of 2757 men?

3. 18 is 25% of what number?

4. The area of a rectangle is 270 yd., and the width is 15 yd. What is the length?

5. Find the area of a triangle, whose base is 26 ft. and altitude 14 ft.

6. What is the area of a triangle whose altitude is 10 yd. and base 40 ft?

7. If ½ lb. of butter cost 15 cents, how much should a grocer pay for 10 tubs, each weighing 60 lb?

8. If an ounce of coffee is used for breakfast every day, how long will 15 lb. last?

9. Find the surface of a prism whose altitude is 7 ft. and its base a square, each side of which is 4 feet.

10. Find the entire surface of a square pyramid whose slant height is 16 ft. and each side of the base six ft.

11. How many yards are there in 1143 feet?

12. How many quarts are there in 15 bu. 3 pk. 6 qt.? How many quarts would each boy receive if the nuts were equally divided among 15 boys?

13. How many ounces are there in 570 pounds?

14. In a barrel of flour there are 196 lb. What will 5 bbl. cost at 3¢ a pound?

15. What will ½ of 24 cords cost at $8½ a cord?

16. If $1800 is one-half of a man's property, what is one-quarter of it?

17. A miller has 45 sacks of wheat, holding 1¼ bu. each. How many bushels of wheat has he?

18. If a man earns $325 in a year, how much will he have left after paying his board at the rate of $16 a month?

19. If 3 yd. of silk cost $1.80, what will be the cost of 5¾ yd.?

1. Add:

2.85	8.97	147.02	47.38
15.05	117.36	16.69	208.36
14.72	6.24	307.70	93.46
104.25	105.04	250.38	350.75
27.78	81.49	47.32	68.80
.47	9.96	1.96	78.07
60.48	5.84	.36	273.60
4.96	83.50	21.00	96.69

Find the cost of:

2. 78 bu. of flour at $6.25 a barrel.

3. 86 bu. of wheat at $.94 a bushel.

4. 97 tons of hay at $6.45 a ton.

5. How many barrels of oil at $5 a barrel will pay for 200 lb. of sugar at 4½¢ a pound?

6. How many square feet in a rectangular piece of land 136 ft. long and 125 ft. wide?

7. Find the area and the distance round a rectangular lot 16 yd. wide and 5 rd. long?

8. Find the area of a triangle whose base is 180 feet and altitude 120 ft.

9. Find the convex surface of a tower in the form of a square pyramid whose base is 100 ft. square and slant height 140 ft.

10. I start on a journey with $125.50. If I spend the following sums, $4.22, $8.63, $21.16, $17.34, $14.15, $37.25, what ought I to have on my return?

11. A man earns $1350 a year. If his expenses every year are $875, how much money can he save in 5 years?

12. How many bushels of potatoes, at 65¢ a bushel, will pay for 48 yd. of cloth at $1.30 a yard?

13. Martha picked 15 qt. of berries, and sold them for 5¢ a pint. How much did she get for her berries?

1. I want to use 12 pieces of ribbon, each ⅓ of a yard in length. How many yards do I need?

2. If you walk 3½ miles in 1 hour, 4½ in another, and 3⅓ in another, how many miles do you walk in the three hours?

3. John had $2¼; he earned $1¼ more, and then spent $2¼. How much money had he then?

4. James paid $1¾ for a book, and $1¼ for a toy. How much did both cost?

5. 72 in. equals how many feet? How many yards?

6. How many yards in 66 feet?

7. James's house is ¼ mile from the schoolhouse. How far does he walk in going to and from school?

8. How many times can a cup holding ⅔ of a pint be filled from a jar holding 4 pints?

9. How many bottles, each holding ¼ pint, can be filled from a pitcher holding 4 pints?

10. How many bushels of wheat, at $¾ a bushel, can be bought for $6?

11. Mr. Day bought a sleigh, and paid $45 down, which was ⅝ of the whole price. Find the cost of the sleigh.

12. If 8 apples are worth 2 oranges, how many oranges can you get for 32 apples?

13. If ⅔ of the cost of a cow is $12, what is the whole cost?

14. 32 is ⅝ of what number? ⅔ of what?

15. 24 is ⅔ of what number? ⅝ of what number?

16. ⅔ of a flag-staff broke off, and the part standing is 30 ft. What part of the staff is standing? What was the length of the staff?

17. After spending ⅔ of my money for books, and ⅕ for clothing, how many fifths have I left? If I have $20 left, how much had I at first?

18. 40 is ⅝ of what number? ⅔ of what number?

(See Part I., page 195.)

12 things	= 1 dozen.	20 things	= 1 score.
12 dozen	= 1 gross.	24 sheets	= 1 quire.
12 gross	= 1 great gross.	20 quires	= 1 ream.

1. How many sheets of paper in 12½ quires? In 12½ reams?

2. What will 7200 sheets of paper cost at $6 a ream?

3. How many pencils are there in 25 boxes, if each box contains 1 gross?

4. What will 36 gross of lead pencils cost at 3¢ each?

5. How old is a man who is four score and ten years old?

6. A printer used 3 reams, 5 quires, 19 sheets of paper in printing posters. If each sheet made 2 posters, how many posters did he print?

7. What is the cost of 3240 sheets of foolscap at 24 cents a quire?

8. If a dealer sold 25 boxes of ink, and each box contained 2 doz. bottles, how many gross did he sell?

9. How many single things in 5 great gross?

10. How many sheets in 8¾ quires? In ⅜ of a ream?

11. If a person buys a ream of paper for $3, and retails it at 1¢ a sheet, how much profit will he make?

12. How many reams of paper at 10¢ a quire can be bought for $6?

13. At $1½ per dozen, what will 4 gross of writing books cost?

14. If pencils cost $2.88 a gross, what will 1 doz. cost? What will 3½ doz. cost?

15. What is the cost of ½ a gross of lead pencils at 50¢ a dozen?

16. What will shoe tacks cost a dozen at the rate of $2.88 a great gross?

17. What will 5 gross of pens cost at the rate of 2 pens for a cent?

18. How much will 9 eggs cost at 20¢ a dozen?

19. Five dozen collars are sold for $9.00. Find the cost of one collar.

1. A man had $6,300.   He paid $4200 for a house, $475.50 for repairs, and $264.75 for furniture.   How much money had he left?

2. Sold a horse for $175, and lost $35.   What did it cost? How much would have been gained or lost by selling the horse for $190?

3. If 4 tons of coal cost $25.52, what will 42 tons cost?

4. Find the cost of 368 bbl. of flour @ $4⅝.

5. Find the cost of 208 yd. of cloth @ $⅞.

6. Find the cost of 508½ bu. potatoes @ 62¢.

7. Find the cost of 62¼ doz. eggs @ 16¢.

8. Find the cost of 12⅜ acres land @ $160.

9. I bought at one time 7⅞ lb. of meat, and at another time 5¾ lb.   What did it all cost at 12¢ a pound?

10. A man had $16¼.   He spent $4⅜ at one time, and $6½ at another time.   How much money had he left?

11. If $\frac{1}{13}$ of a lot of goods is worth $360, what is ⅓ of the lot worth?   ¼?

12. Add:

5⅞	3¼	7⅝	46½	16$\frac{7}{13}$
2⅔	7⅜	9½	24⅞	18⅞
4½	8⅞	11⅓	13$\frac{3}{10}$	65¼
5⅞	10$\frac{4}{13}$	16⅜	46⅞	38⅜
6¼	4¼	4⅞	14⅓	14¼

13. What is the cost of 3 pk. 5 qt. of apples at 24¢ a peck?

14. 50 bbl. of sugar cost $175, what do 25 bbl. cost?

15. If a hat cost $2.50, what will 50 hats cost at the same price?

16. A roll of ribbon is 50 ft. long.   What is it worth at 9¢ a yd.?

17. A rectangular piece of land 20 ft. long and 8½ ft. wide contains how many square feet?   How many feet of fence will it take to fence it?

1. What is 10% of $900 ? $40 ? $200 ? $10 ?

2. What per cent of $10 is $2.50 ? $5 ?

3. What per cent of 12 is 3 ?   Of 120 is 60 ?   Of 125 is 25 ?

4. 60 is 20% of what number?   50 is 25% of what number?

5. $70 is 10% of how many dollars?

6. A man paid $80 for a horse, and sold it for 10% more than it cost him.   For how much did he sell it?

7. A man bought a horse for $80, and sold it for $88.   How many dollars did he gain?   What per cent did he gain?

8. A man paid $5 for a hat, and sold it at 20% profit.   For what did he sell it?

9. A dealer paid $5 for a hat, and sold it for $6.   What per cent did he gain?

10. A merchant bought velvet at $4 a yard, and sold it at $5 a yard.   What per cent did he gain?

11. A merchant bought velvet at $5 a yard, and sold it at $4. What was the per cent of loss?

12. How many days in 6 weeks?   In 10 weeks?   In 7 weeks? In 9 weeks?

13. How many weeks in 35 days?   In 49 days?   In 56 days?

14. How many seconds in 5 minutes?   In 10 minutes?

15. How many square feet in a board 20 ft. long and $1\frac{1}{2}$ ft. wide?

16. How many square yards in a pavement 12 yd. long and 5 yd. wide?

17. How many square yards in 36 sq. ft.?   In 90 sq. ft.?   In 72 sq ft.?

18. How many square feet in 9 sq. yd.?   In 5 sq. yd.?   In 3 sq. yd.?

19.
$3\frac{1}{3} + \frac{1}{3}$ $3\frac{2}{3} + 5\frac{1}{3}$ $7\frac{1}{2} + \frac{1}{2}$ $4\frac{1}{2} + 6\frac{1}{2}$

$7\frac{1}{2} + 1\frac{2}{3}$ $5\frac{1}{3} + 5\frac{2}{3}$ $9\frac{1}{2} + \frac{1}{2}$ $7\frac{1}{2} + 9\frac{1}{2}$

$2\frac{1}{4} + \frac{1}{3}$ $8\frac{1}{4} + 1\frac{3}{4}$ $7\frac{3}{4} + 9\frac{1}{4}$ $9\frac{3}{4} + 9\frac{1}{4}$

1. A man had $7200; he paid $4000 for a house, $650 for repairs, and $464.75 for furniture. How much money had he left?

2. A man sold 56 yards of cloth for $128, gaining $16. What did it cost him a yard?

3. If 23 carriages cost $4025, what are 80 carriages worth?

4. A farmer's wife sold a storekeeper 18 doz. eggs at 14¢ a dozen, and 35 lb. butter at 21¢ a pound. How much did the storekeeper owe her?

5. A horse costs $265, a carriage $235, and a hack 3 times as much as both. What did they all cost?

6. 15 gal. 1 qt. 0 pt. 3 gills, are how many gills?

7. How many feet of moulding will be required to go round a room, if it is 35 ft. long and 30 feet wide?

8. Add $\frac{3}{4}$, $4\frac{1}{2}$, $5\frac{2}{3}$, $10\frac{3}{4}$.

9. At $7.86 a barrel, what will 18 barrels of flour cost?

How many square inches in each of the following rectangles? Change each dimension to inches before multiplying.

10. 1 ft. 3 in. by 1 ft. 7 in.

11. 4 ft. 11 in. by 5 ft. 8 in.

12. 6 ft. 3 in. by 4 ft. 11 in.

13. 5 ft. 6 in. by 4 ft. 3 in.

14. 9 ft. 7 in. by 8 ft. 9 in.

15. 36 ft. by 23 ft. 5 in. Answer to be in sq. ft.

16. A man deposited in the bank $30 a month for 10 months, and $25 a month for the other months of the year. How many dollars did he deposit during the year?

17. What will a yard of silk cost at the rate of $25.60 for 16 yards? What will $\frac{1}{2}$ of a yard cost?

18. A man bought a horse for $120 and another for $75. He sold the two horses for $150. How many dollars did he lose?

1. A grocer sold 118¾ lb. of flour to one customer, 106⅜ lb. to another, and 230½ lb. to another.

2. Bought a barrel of kerosene oil containing 42 gal. for $6.30. I sold it for 16½¢ a gallon.

3. A farmer sold ⅛ of his farm of 224 acres at $52.25 an acre.

4. A man had 10.5 yd. of cloth, and used 4.15 yd. to make a suit.

5. A bought of B 498 acres of land at $37 an acre, and gave in payment a house worth $2250, a factory worth 4 times as much, and the rest in money.

6. A man bought a farm for $6450, giving in exchange a house worth $4500, a note for $1150, and paying the difference in money.

7. A merchant bought 864 bu. of wheat for $622.08, and sold it at $0.95 a bushel.

8. A man who had 256 gal. of vinegar, put it into barrels, each holding 32 gal.

9. A farmer, having 600 sheep, sold 215 of them to a butcher, and 310 to another farmer.

10. Bought a pair of boots for $4.62, an umbrella for $1.75, a pair gloves for $0.87, a necktie for $1, and some collars for $.62.

11. 139 bbl. of beef cost $2189.25.

12. A man had $60, and gave 33⅓% of it to his daughter.

13. A dealer sold 20 doz. pairs of shoes at $1.75 a pair.

14. A room is 18 ft. long, 14 ft. wide, and 12 ft. high.

15. A carload of 620 bu. of oats was bought for $175, and sold for 35¢ a bushel.

16. One week a merchant gained $2200, the next week he lost $816; the third week he lost $528, but the fourth week he gained $1719.

These examples are to be done orally.

1. How many faces has a cube?

2. How many edges has a cube?

3. How many corners has a cube?

4. How many faces has the crayon-box?

5. How many edges has the crayon-box?

6. How many corners has the crayon-box?

7. If the crayon-box has the same number of faces, edges, and corners as the cube, is it a cube? Why not?

8. Can you build a cube with 8 small cubes? What are the dimensions of it?

9. If you make your cube 1 block longer, wider, and higher, how many blocks do you use?

10. If a block is 4 in. long, 4 in. wide, and 2 in. high, is it a cube? How many times higher must it be to be a cube? What part of a cube is it? How many square inches in the top of the block? How many in one side? How many in one end?

11. If 4 qt. of currants cost $1, how much is that a peck? A bushel?

12. If an oblong is 16 inches round it, how long and wide might it be?

13. If a square is 16 in. round it, how long and wide is it?

14. Find the area of a board 6 ft. long and 1½ ft. wide.

15. A rectangular garden-bed is 8 ft. long and 4 ft. wide. What is the perimeter? What number of square feet does it contain?

16. What is the area in square yards of a rectangular flower-bed 27 ft. long and 6 ft. wide?

17. What do you call a cubical block, if each edge measures 1 inch?

18. What do you call a cubical block, if each edge measures 1 foot?

1. How many pounds of hay can be cut from 12 acres of land that yields 4 tons to the acre?

2. I bought 75 horses at $135 each, 85 cattle at $62 each, and 275 hogs at $17 each. How much did they all cost?

3. Find the cost of:

63 yd. muslin @ 9¢.

47 yd. cashmere @ 87¢.

62 yd. flannel @ 68¢.

45 yd. velvet @ $1.25.

4. Find the amount of the following articles:

24 tons hard coal @ $5.75.

19 tons soft coal at $4.12.

46 tons coke @ $2.75.

78 cords wood at $6.80.

5. A man bought two farms, one containing 115 acres at $67 an acre, the other 85 acres at $72 an acre. How much did both farms cost him?

6. By selling 13 acres of land for $583, I lose $54. What is the cost an acre? ·

7. How many tons of coal at $7.50 a ton will pay for 75 thousand feet of lumber at $29 a thousand?

8. 160 pints are how many quarts? Pecks? Bushels?

9. 15 pk. 6 qt. are how many quarts? Pints?

10. Bought a tract of land, and cut it up into 28 building lots, which I sold at $379 each, thereby gaining $1428. What was the cost of the land?

11. Mr. Smith bought 19 cows for $532. The cost of feeding them was $7 a head. He sold them for $798. How much did he gain or lose?

12. What are 7432 qt. of berries worth at 60¢ a peck?

13. What is the value of 17 lb. 8 oz. of paper at 24¢ a pound?

1. What is the cost of .75 yd. of cloth at $3.20 a yard ?

2. Find the cost of 25.5 acres of land at $29.50 an acre.

3. A farmer sold 235.38 acres of land at $28.50 an acre. What did he receive for his land ? He took in payment 10 horses at $119.50 each, 28.5 tons of coal at $6.20 a ton, 511.32 cords of wood at $4.25 a cord, and the rest in money. How much money did he receive ?

4. A house was bought for $2,475.50. For how much must it be sold to gain $255½ ?

5. Find the value of 384 acres of land at $9¾ per acre ?

6. If 9 yoke of oxen cost $1,350, what is the cost of 1 yoke ?

7. I bought a horse for $125, which is ¼ of what I sold it for. For what did I sell it ?

8. A worked 10 hr. Monday, 11 hr. Tuesday, 9 hr. Wednesday, 8 hr. Thursday, 11 hr. Friday, 11 hr. Saturday. If 10 hr. is considered a day's labor, find out how much A earned during the week at $3.20 a day.

9. A dealer bought 180 horses for $13,680. What must he pay at that rate for 95 ?

10. If 25 cows cost $1,475, what will 318 cost at the same rate ?

11. How many square feet in a walk 250 yd. long, and 6 ft. wide ? Square yards ?

12. A barn is 62 feet long, and from the eaves to the ridge pole of the roof it is 22 ft. How many square feet are there in both sides of the roof ?

13. If a person breathes 18 times a minute, and takes into the lungs 26 cubic inches of air at every breath, how many cubic inches will he breathe in 4 hours ?

14. How many cubic feet in a box 72 in. long, 60 in. wide, and 48 in. high ?

15. How many rods in 17 miles, 38 rods ?

16. How many pints in 47 bu. 3 pk. 2 qt. ?

This work should be done orally.

1. $\frac{1}{2} + \frac{1}{4}$ $1 - \frac{1}{4}$ $10\frac{1}{2} + 3\frac{1}{2}$ $16\frac{1}{2} - 9\frac{1}{2}$
    $1 + \frac{1}{2}$ $1\frac{1}{2} - \frac{1}{2}$ $6\frac{1}{2} + 3$ $17\frac{1}{2} - 8$
    $1\frac{1}{2} + \frac{1}{4}$ $2 - \frac{1}{2}$ $8\frac{1}{2} + 9$ $24 - 16\frac{1}{2}$
    $2\frac{1}{2} + \frac{1}{4}$ $2\frac{1}{2} - 1\frac{1}{2}$ $7\frac{1}{2} + 7\frac{1}{2}$ $34\frac{1}{2} - 24\frac{1}{2}$
    $6\frac{1}{2} + \frac{1}{2}$ $4 - 1\frac{1}{2}$ $21 + 9\frac{1}{2}$ $24\frac{1}{2} - 12\frac{1}{2}$
    $1\frac{1}{2} + 2\frac{1}{2}$ $7\frac{1}{2} - 2\frac{1}{2}$ $13\frac{1}{2} + 7\frac{1}{2}$ $9\frac{1}{2} - 3$
    $6\frac{1}{2} + 2\frac{1}{2}$ $6 - 2\frac{1}{2}$ $19\frac{1}{2} + 9\frac{1}{2}$ $15 - 7\frac{1}{2}$

2. Perform the following operations, and then add $2\frac{1}{2}$ to each:
    $3\frac{1}{2} + 6$ $7 + 2\frac{1}{2}$ $15 - 7\frac{1}{2}$ $13\frac{1}{2} - 8$
    $12\frac{1}{2} - 6\frac{1}{2}$ $4 \times 6\frac{1}{2}$ $6 \times 7\frac{1}{2}$ $8\frac{1}{2} + 12\frac{1}{2}$

3. At $3\frac{1}{2}\not{c}$ a pint, how much will 2 gallons of milk cost?

4. Make and perform problems from the following:
$7\frac{1}{2} \times 8$ $7 + 2\frac{1}{2}$ $6 \times 8\frac{1}{2}$ $12\frac{1}{2} + 6\frac{1}{2}$
$15 - 4\frac{1}{2}$ $9\frac{1}{2} \times 9$ $5 \times 7\frac{1}{2}$ $19 - 12\frac{1}{2}$ $7 - 3\frac{1}{2}$

5. How many halves in the following numbers?
2? $3\frac{1}{2}$? 7? $5\frac{1}{2}$? $8\frac{1}{2}$? 11? $12\frac{1}{2}$? $9\frac{1}{2}$? 6?

6. Each of the following numbers is $\frac{1}{2}$ of what number?
2? 4? $2\frac{1}{2}$? $\frac{1}{2}$? $2\frac{1}{4}$? $\frac{1}{4}$? 5? $4\frac{3}{4}$? $\frac{3}{4}$? $1\frac{3}{4}$?

7. $\frac{3}{4} \times 2$ $1\frac{1}{2} \times 2$ $2 \times \frac{1}{2}$ $\frac{5}{8} \times 2$
    $1\frac{1}{4} \times 4$ $1\frac{1}{2} \times 4$ $\frac{3}{4} \times 2$ $6 \times \frac{1}{4}$
    $2\frac{3}{4} \times 4$ $\frac{1}{4} \times 4$ $2\frac{3}{4} \times 2$ $3\frac{1}{2} \times 4$
    $\frac{3}{4} \times 2$ $4 \times 2\frac{1}{2}$ $2 \div 4$ $4 \times \frac{1}{4}$
    $4\frac{1}{4} \times 8$ $8 \times 2\frac{3}{4}$ $6\frac{3}{4} \times 4$ $8 \times \frac{1}{4}$

8. How many eighths in $\frac{1}{2}$, $\frac{3}{4}$, $1\frac{1}{2}$, $3\frac{3}{8}$, $4\frac{1}{4}$, $2\frac{1}{2}$, $4\frac{1}{2}$, $6\frac{1}{2}$?

9. If $\frac{1}{2}$ a yard of cloth costs 20 cents, what will be true of 10 cents? $40\not{c}$? 1 yd.? $2\frac{1}{2}$ yd.? $3\frac{1}{4}$ yd.?

10. When $\frac{3}{4}$ of a pound of tea costs 20 cents, what will be true of $\frac{1}{4}$ lb.? $\frac{1}{2}$ lb.? 1 lb.? $1\frac{1}{2}$ lb.? 10 cents? 20 cents? 40 cents?

11. If $\frac{3}{4}$ of a barrel of sugar costs $6, what will $\frac{3}{8}$ cost? $\frac{4}{8}$?

12. What part of a peck is a quart? 2 qt.? 3 qt.? 4 qt.? 5 qt.? 6 qt.?

1. Add four thousand fifty-six; sixty-three thousand seven hundred; nine thousand ninety-nine; six thousand nine hundred seventy-eight.

2. From four thousand three hundred seven take two thousand three hundred twelve.

3. Reduce $63\frac{7}{13}$ and $74\frac{11}{13}$ to improper fractions.

4. Add $33\frac{1}{3}$, $37\frac{1}{2}$, $55\frac{3}{4}$, $66\frac{2}{3}$.

5. From a cask containing $45\frac{1}{2}$ gal. of syrup, a grocer sold one customer $16\frac{2}{3}$ gal., and another $21\frac{5}{8}$ gal. How many gallons remained unsold?

6. If $\frac{4}{15}$ of an acre of land cost $68, what will $12\frac{2}{3}$ acres cost?

7. A man pays $350 a year for house rent. This is $\frac{5}{11}$ of his income. What is his income?

8. A school enrolls 208 boys, and $\frac{4}{5}$ of the pupils are boys. How many pupils are enrolled in the school?

9. What is the sum of $.65, $15.44, $60, 62\frac{1}{2}$, $100, $94.05, 87\frac{1}{2}$?

10. A grocer bought 540 pounds of coffee for $145.80, and 420 lb. of tea for $336. He sold the coffee at 30¢ a pound, and the tea at $1.00 a pound. How much did he gain?

11. How many square feet in the walls of a room 24 ft. by 18 ft., and $10\frac{1}{2}$ ft. high? What is the area of the ceiling?

12. How many yards of picture moulding will be required for the room in Example 11? and what will it cost at 15¢ a yard?

13. How many square feet in a lot $62\frac{1}{2}$ ft. by 208 ft.?

14. What is the area of a triangle whose base is 36 in. and altitude 15 in.?

15. Mr. Brown owed Mr. Jenkins $172. In payment he gave a horse and $57 in cash. Find the value of the horse.

16. A flour dealer bought 42 bbl. of flour for $210. He sold $\frac{1}{2}$ of it at $4.75 a barrel, and the remainder at $6 a barrel. How much did he gain?

1. How many cubic feet in the following boxes:
  a. 6 ft. long, 3 ft. wide, and 2 ft. high?
  b. 10 ft. long, 5 ft. wide, and 4 ft. high?
  c. 6 ft. long, 3 ft. wide, and 3 ft. high?
  d. 8 ft. long, 5 ft. wide, and 2 ft. high?
  e. 5 yd. long, 4 yd. wide, and 3 yd. high?
  f. 44 ft. long, 3½ ft. wide, and 7 ft. high?
2. Reduce 12 bu. 5 qt. to pints.   Reduce 503 pt. to bushels.
3. If a rectangular field is 84 ft. long and 60 ft. wide, how many boards, each 12 ft. long, will it take to go round it?   How many boards to make a fence five boards high?
4. If 13 tons of hay cost $97.50, what will 7½ tons cost?
5. If 9 men can build a wall in 15 days, how long will it take 5 men to build it?
6. At the rate of 5 peaches for 8 apples, how many apples can be bought for 5 dozen peaches?
7. If ⅔ of a farm is worth $4,500, what are ⅗ of the whole farm worth?   What is ¾ of it worth?
8. A man buys a rectangular piece of ground 300 ft. long by 150 ft. wide.   He builds a house 50 ft. by 30 ft., and a shed 12 ft. by 13 ft.   How many square feet of the lot are not covered by the buildings?
9. How many square feet are there in a board fence 10 ft. high round a rectangular lot 250 ft. long, 200 ft. wide?
10. How many acres are there in a rectangular field 80 rd. long, 70 rd. wide?   How much is it worth at $75 an acre?
11. Draw a figure to represent the ceiling and 4 walls of a room 24 ft. long, 18 ft. wide, 12 ft. high.   Scale 1 in. to 6 ft. Find the number of square feet in all.
12. What is the average price of 9 cows that cost respectively $34, $46, $52, $58, $80, $45, $55, $50 and $75?
. **13.** A man receives in a year $450 rent from a house, $1350 for rent of a mill, $660 for rent of a farm.   What is his income for one month?

1. A boy is carrying 6¼ lb. of flour and 6⅛ lb. of ham. What is the weight of his load?

2. How much will 60 eggs cost at 20 cents a dozen?

3. If you should buy a paper of pins for 8 cents, some tape for 6 cents, and an apron for 30 cents, how much change would you receive from 50 cents?

4. At 25¢ each, you could buy how many things for $1? For $2?

5. Give a short method for finding how many articles can be bought for a certain number of dollars at 25¢ each.

At 25¢ each, you can buy how many:

6. Base balls for $9?

7. Hats for $11?

8. Cakes of soap for $3¼?

9. Pounds of candy for $2¼?

10. Yards of cloth for $5¼?

11. At 33⅓¢ each, how many things can you buy for $1? $2?

12. State a short way for finding how many things at 33⅓¢ each can be bought for a given number of dollars.

At 33⅓¢ each, you can buy how many:

13. Yards of ribbon for $4?

14. Pairs of cuffs for $12?

15. Pounds of butter for $9?

16. Pounds of candy for $1½?

17. Pecks of nuts for $2⅔?

18. Dozen of oranges for $3.33⅓?

19. Dolls for $4.66⅔?

20. Knives for $6½?

21. Straw hats for $2.66⅔?

22. Cans of milk for $5?

23. Articles for $7½?

24. Articles for $8?

1. Divide 4 books by 2. Divide 4 ninths by 2.

$\frac{4}{9} \div 2 = \dfrac{4 \div 2}{9} = \frac{2}{9}.$ This point should be illustrated by the fractional disks.

Perform the following examples by means of the disks:

1.

$\frac{3}{4} \div 3$	$\frac{6}{7} \div 3$	$\frac{8}{13} \div 4$	$\frac{12}{3} \div 6$
$\frac{8}{9} \div 4$	$\frac{4}{8} \div 4$	$\frac{18}{8} \div 9$	$\frac{15}{4} \div 5$
$\frac{4}{8} \div 5$	$\frac{10}{3} \div 5$	$\frac{48}{11} \div 8$	$\frac{9}{7} \div 3$
$\frac{9}{7} \div 6$	$\frac{8}{5} \div 6$	$\frac{24}{23} \div 12$	$\frac{8}{11} \div 4$
$\frac{7}{8} \div 7$	$\frac{14}{8} \div 7$	$\frac{99}{11} \div 22$	$\frac{13}{8} \div 6$

2.

$\frac{18}{13} \div 9$	$\frac{15}{8} \div 3$	$\frac{28}{9} \div 4$	$\frac{18}{15} \div 6$
$\frac{18}{9} \div 5$	$\frac{31}{7} \div 11$	$\frac{27}{7} \div 9$	$\frac{33}{8} \div 8$
$\frac{36}{7} \div 9$	$\frac{44}{8} \div 11$	$\frac{45}{6} \div 9$	$\frac{32}{3} \div 4$

3. Change mixed numbers to improper fractions before dividing:

$6\frac{2}{3} \div 4 = ?$	$8\frac{1}{3} \div 5 = ?$	$6\frac{3}{4} \div 9 = ?$	$11\frac{1}{4} \div 8 = ?$
$8\frac{3}{4} \div 5 = ?$	$5\frac{5}{8} \div 9 = ?$	$8\frac{3}{4} \div 7 = ?$	$3\frac{3}{4} \div 6 = ?$
$5\frac{5}{11} \div 12 = ?$	$4\frac{2}{3} \div 7 = ?$	$9\frac{3}{8} \div 15 = ?$	$12\frac{3}{4} \div 10 = ?$

4. Divide:

$10\frac{1}{2}$ by 7	$2\frac{7}{8}$ by 8	$5\frac{1}{4}$ by 3	$8\frac{3}{4}$ by 5
$9\frac{1}{2}$ by 4	$11\frac{3}{8}$ by 7	$6\frac{4}{7}$ by 23	$7\frac{4}{5}$ by 23
$6\frac{3}{4}$ by 9	$7\frac{1}{3}$ by 11	$11\frac{1}{4}$ by 9	$5\frac{3}{8}$ by 16

5. Divide:

$1\frac{3}{8}$ by 5	$1\frac{7}{8}$ by 3	$3\frac{1}{8}$ by 8	$3\frac{1}{4}$ by 17
$1\frac{7}{8}$ by 4	$1\frac{1}{8}$ by 7	$3\frac{5}{8}$ by 5	$3\frac{5}{8}$ by 7
$4\frac{5}{8}$ by 12	$1\frac{7}{8}$ by 5	$3\frac{7}{8}$ by 13	$3\frac{7}{8}$ by 9

6. Divide:

$3\frac{1}{4}$ by 7	$1\frac{5}{8}$ by 9	$3\frac{5}{8}$ by 7	$2\frac{5}{8}$ by 13
$1\frac{5}{8}$ by 5	$3\frac{7}{8}$ by 5	$3\frac{7}{8}$ by 10	$4\frac{7}{8}$ by 8
$3\frac{5}{8}$ by 7	$3\frac{1}{4}$ by 3	$3\frac{3}{8}$ by 8	$4\frac{3}{8}$ by 7
$7\frac{1}{2}$ by 5	$4\frac{2}{3}$ by 7	$6\frac{3}{4}$ by 9	$4\frac{1}{4}$ by 4
$3\frac{3}{8}$ by 6	$5\frac{1}{3}$ by 8	$7\frac{1}{5}$ by 3	$7\frac{2}{3}$ by 12

Learn: Divide the numerator of the fraction by the integer.

$21 \div \frac{3}{4} =$
$\frac{84}{4} + \frac{3}{4} =$
$84 \div 3 = 28$

First change the integer to a fraction whose denominator is the same as that of the divisor. 21 equals $\frac{84}{4}$. $\frac{84}{4}$ and $\frac{3}{4}$ being like fractions are divided like integers. 84 divided by 3 equals 28.

1. Divide: 12 by $\frac{3}{4}$ 7 by $\frac{2}{3}$ 8 by $\frac{4}{5}$ 10 by $\frac{3}{8}$

           6 by $\frac{5}{8}$ 9 by $\frac{2}{3}$ 12 by $\frac{3}{8}$ 9 by $\frac{5}{8}$

2. Divide: 30 by $\frac{3}{4}$ 55 by $\frac{5}{6}$ 63 by $\frac{9}{15}$ 77 by $\frac{7}{18}$

           62 by $\frac{31}{1}$ 15 by $\frac{2}{3}$ 16 by $\frac{3}{4}$ 20 by $\frac{4}{5}$

3. Divide: 45 by $\frac{5}{8}$ 56 by $\frac{7}{8}$ 21 by $\frac{3}{7}$ 42 by $\frac{?}{5}$

           30 by $\frac{5}{6}$ 40 by $\frac{10}{3}$ 16 by $\frac{14}{3}$ 12 by $\frac{3}{8}$

Change mixed numbers in your divisors to improper fractions.

4. Divide: 10 by $1\frac{2}{3}$ 4 by $1\frac{1}{3}$ 14 by $2\frac{1}{3}$ 42 by $4\frac{1}{5}$

           90 by $6\frac{2}{7}$ 90 by $5\frac{2}{8}$ 120 by $6\frac{2}{3}$ 7 by $2\frac{1}{3}$

5. Divide: 54 by $10\frac{4}{5}$ 22 by $5\frac{1}{2}$ 14 by $2\frac{1}{3}$ 5 by $2\frac{1}{2}$

           30 by $3\frac{3}{4}$ 120 by $2\frac{6}{7}$ 51 by $2\frac{6}{7}$ 20 by $\frac{4}{5}$

6. Divide:

210 by $\frac{7}{10}$ 396 by $5\frac{1}{2}$ 57 by $6\frac{1}{3}$ 275 by $30\frac{5}{8}$

360 by $3\frac{1}{3}$ 45 by $4\frac{1}{2}$ 76 by $4\frac{2}{3}$ 16 by $\frac{2}{7}$

7. Learn: Change the integer to a fraction whose denominator is the same as that of the divisor, then divide the numerators.

8. Multiply: $\frac{2}{3}$ by 96 $24\frac{2}{3}$ by 18 $69\frac{2}{7}$ by 42

            128 by $\frac{3}{4}$ $111\frac{4}{7}$ by 28   67 by $\frac{4}{7}$

            $3\frac{5}{12}$ by 72 $17\frac{1}{4}$ by 6 $\frac{7}{8}$ by 64

9. Divide: 8 by $\frac{4}{5}$ $2\frac{2}{3}$ by 4   12 by $\frac{3}{7}$

           $\frac{30}{7}$ by 10 $3\frac{3}{4}$ by 5   14 by $1\frac{3}{4}$

           $8\frac{5}{8}$ by 11 $4\frac{5}{11}$ by 7 $24\frac{1}{2}$ by 5

           $6\frac{3}{4}$ by 9 $22\frac{1}{2}$ by 9   36 by $3\frac{3}{5}$

1. How many ounces in ½ lb.? In ¼ lb.? In ¾ lb.?

2. How many pounds in ½ ton? In ¼ ton?

3. What is the cost of 1 lb. 4 oz. of grass seed at 2¢ an oz.?

4. 1 bu. of oats weighs 32 lb. How many pounds in a peck? Quart?

5. How many feet in 5 yd. 2 ft.?

6. What is the cost of 9 ft. of ribbon at 10¢ a yard?

7. At 10¢ a mile, what will it cost to travel 6½ miles and back again?

8. There are 72 cows and sheep in a field. One sixth are cows. How many sheep are there? How many more sheep than cows?

9. A tree is 72 feet high, and 9 times as tall as it is round it at the base. How many feet round the base?

10. A wagon cost $60, which is 5 times the cost of a harness. What is the cost of both wagon and harness?

11. If 6 lb. of coffee cost $1.80, what will ½ lb. cost?

12. How many men can build a wall in 10 days, if 5 men can build it in 20 days?

13. If 5 men can build a wall in 20 days, in how many days can 10 men build it?

14. How much will ¾ of 12 yd. of silk cost, if 7 yd. cost $14?

15. How much will 9 bbl. of vinegar cost, if 5 bbl. cost $45?

16. 9 men can mow 36 acres in a day. How many acres can 3 men mow in a day? 6 men? 12 men?

17. If 5 yd. of silk cost $15, what will 7 yd. cost? 12 yd.?

18. Find the cost of 10 lb. rice @ 7¢.

19. Find the cost of 12 bbl. flour @ $6½.

20. Find the cost of 12 months rent @ $30.

21. If the school is ¾ of a mile from Jennie's house, how many miles must she walk every day if she goes home at noon and back in the afternoon?

1. Is there any difference in value between $\frac{1}{10}$ and .1 ?

2. Is there any difference in value between $\frac{1}{100}$ and .01 ?

3. What is the difference between a decimal fraction and a common fraction?

4. Write the following decimals as common fractions, and then reduce them to their lowest terms:

   .6   .05   .10   .8   .15   .20   .12   .2
   .3   .02   .50   .9   .75   .80   .40   .5

5. Change the following to common fractions:

   .125   .350   .60   .7   .475   .245
   .148   .412   .55   .4   .145   .366

6. Change to common fractions:

   .25   .275   7.5   .175   .032   .12½
   .24   .165   4.25   .375   .025   .87½

7. Multiply:

   46.83   58.09   83.07   65.80   38.87
     38   57   49   68   94
   _____   _____   _____   _____   _____

8. Multiply:

   6.4   308.3   70.56   308.8   7.08
    .5   .4   .06   .46   .03
   ____   _____   _____   _____   _____

9. Multiply:

   .03 × 14.6   .7 × .08   .08 × .06   90.06 × .03
   6.03 × 4.6   4.1 × .4   7.5 × .02   20.05 × .5

10. Divide:

   6.08 by .08   18.03 by .03   7.14 by .07   .6 by .01
   36   by 1.2   40.8 by 1.6   .05 by .025   20   by .05

11. Divide: .08 by 4, by .4, by .04, by .004.
               6.03 by 3, by .3, by .03, by .003.

12. Read:

   75.68   19.041   18.724   10.101
   12.005   28.008   71.078   11.111

1. Change to improper fractions:

    627⅝,   327¾,   15⅓⅓,   18₇/₁₆,   27⅜.

2. Add: 21⅓⅝ and 18⅓. 91⅝ and 62⅓. 83⅞ and 39⅝. 114⅝ and 72₃/₁₀. Subtract the second from the first in each case.

3. Find the cost of:

    16⅞ yd. @ \$2.72   63 yd. @ \$0.31⅝

    18⅝ doz. @ 24¢   44 books @ \$0.26¼

4. Change to common fractions:

    .80, .125, .375, .675, .875, .0125, .0625, .025, .640, .95, .75.

5. Multiply: .3 by 273   6.5 by 37.2   .8 by 6.4

    4.5 by 90.8   .08 by 9.6   .26 by 37.5

6. Multiply: 221½ by 4   264 by 2½   201½ by 10

    362½ by 3   363 by 3½   403⅞ by 12

    655⅞ by 6   244 by 4¾   621⅝ by 18

    421⅞ by 5   325 by 5⅝   869⅞ by 25

7. Divide: 25 by 2⅓   213½ by 4   263½ by 12

    39 by 3¼   321½ by 3   337½ by 18

    36 by 3⅞   622½ by 5   422⅞ by 16

    45 by 1½   220½ by 6   332⅞ by 22

8. Find the cost of the following:

    a. 45 houses at \$4,350 each.

    b. 1,348 lb. at 4½¢ a lb.

    c. 365 lb. at 5¢ a lb.

    d. 48 yd. at \$.26½ a yd.

9. If a passenger car costs \$1,750, and a freight car \$475, what is the value of the cars in 2 trains, consisting of 7 passenger cars and 23 freight cars?

10. If it requires 1,345 pickets to fence one side of a square lot, how many pickets will be required to fence 15 such lots?

11. How many ounces in 3,240 pounds?

1. $\frac{1}{2}$ of \$1 = —— cents. $\frac{1}{4}$ of \$1 = —— cents.

$\frac{1}{3}$ of \$1 = —— cents. $\frac{2}{4}$ of \$1 = —— cents.

$\frac{2}{3}$ of \$1 = —— cents. $\frac{3}{4}$ of \$1 = —— cents.

$\frac{1}{5}$ of \$1 = —— cents. $\frac{3}{8}$ of \$1 = —— cents.

$\frac{2}{5}$ of \$1 = —— cents. $\frac{5}{8}$ of \$1 = —— cents.

$\frac{1}{10}$ of \$1 = —— cents. $\frac{2}{10}$ of \$1 = —— cents.

$\frac{3}{10}$ of \$1 = —— cents. $\frac{4}{10}$ of \$1 = —— cents.

2. 50 cents = —— of \$1.   25 cents = —— of \$1.

10 cents = —— of \$1.   20 cents = —— of \$1.

30 cents = —— of \$1.   40 cents = —— of \$1.

60 cents = —— of \$1.   75 cents = —— of \$1.

$66\frac{2}{3}$ cents = —— of \$1. $33\frac{1}{3}$ cents = —— of \$1.

3. There are: —— hours between 10 A.M. and 1 P.M.

—— hours between 8.30 A.M and 2.30 P.M.

—— hours between 9 A.M and 2 P.M.

—— hours between 9.15 A.M and 12.30 P.M.

—— minutes between 10 A.M and 11.30 P.M.

—— months between 1885 and 1895.

—— months between 1887 and 1893.

4. There are: 60 min. in —— hr.   60 sec. in —— min.

120 min. in —— hr.   120 sec. in —— min.

15 min. in —— hr.   15 sec. in —— min.

30 min. in —— hr.   30 sec. in —— min.

45 min. in —— hr.   45 sec. in —— min.

360 min. in —— hr.   360 sec. in —— min.

—— min. in 1 hr.   —— sec. in 1 min.

—— min. in 3 hr.   —— sec. in 3 min.

—— min. in $\frac{1}{4}$ hr.   —— sec. in $\frac{1}{4}$ min.

—— min. in $\frac{1}{6}$ hr.   —— sec. in $\frac{1}{6}$ min.

5. At 25¢ each you can buy:

—— —— for 50 cents.   —— —— for \$5.

—— —— for 75 cents.   —— —— for \$4.

1. If $448 is paid for 28 tons of hay, what is the price a ton?

2. The cost of a piece of cloth was $112.70, and the price was $2.45 a yard. How many yards in the piece?

3. A merchant bought 120 overcoats at $15.85 each. He sold $\frac{1}{2}$ of them at $25 each, and the others he sold in a lot for $820. How much did he gain or lose?

4. A merchant sold a quantity of flour at $4.00 a barrel. How many barrels did he sell if he received $1908 for them?

5. Find the wages due a workman, who has worked 351 hours at $1.75 a day, of 9 hr. each.

6. The three dimensions of a box are 12 in., 10 in., and 8 in. What are its contents in cubic inches?

7. A bank has $24,726 in its safe or vault. One-half is in bank-bills, one-third is in gold, and the rest in silver. What is the value of the silver?

8. How many miles in 640 rd.? 5280 ft.? 3520 yd.? 21,120 ft.?

9. How many square feet in the walls and floor of a room 20$\frac{1}{3}$ ft. long, 15 ft. wide, and 12 ft. high?

10. How many square yards in the walls of a room 18 ft. long, 12 ft. wide, and 9 ft. high?

11. How many reams in 11,520 sheets of paper?

12. If there are 150 pound packages of tacks in a box, what will be the weight of 18 boxes? What are the tacks worth at 9$\frac{1}{2}$¢ a pound?

13. J. Ward worked 9 hours Monday, 11 hours Tuesday, 10 hours Wednesday, 8 hours Thursday, 8 hours Friday, and 6 hours Saturday. If 10 hours' labor is considered a full day, how much did he earn during the week at $2.50 a day?

14. What must be paid for 42 rd. 3 yd. 2 ft. of iron fence at 65¢ a foot?

1. There were 48 present in a class on Monday, 52 on Tuesday, 45 on Wednesday, 47 on Thursday, 38 on Friday. What was the average number present each day?

48
52
45
47
38
5) 230
46

By adding the numbers present on each day, we find there were 230 pupils present for the 5 days. If there were 230 pupils present in 5 days, it would be the same as 46 pupils for each one of the five days.

2. A lady bought one pound of tea for 55 cents, and one pound for 75 cents. What was the average price per pound?

3. If there are 280 pupils in school Monday, 295 Tuesday, 312 Wednesday, 303 Thursday, and 275 Friday, what is the average attendance for the week?

4. What is the average price of 5 horses, if 3 of them cost $150 each, and the others $200 each?

5. What is the average price of 6 horses costing $135, $140, $150, $175, $250, $266 respectively.

6. What number is as much larger than 48 as it is smaller than 52? Find the average of 48 and 52.

7. If the attendance of pupils in your room last week was as follows: Monday 44, Tuesday 41, Wednesday 45, Thursday 38, Friday 42, what was the average attendance for the week?

8. A man worked 8½ hr. Monday, 9 hr. Tuesday, 8 hr. Wednesday, 9½ hr. Thursday, 7¼ hr. Friday, and 5¾ Saturday. How many hours on the average did he work each day?

9. What is the average age of four girls whose ages are 12¼ yr., 13½ yr., 14¼ yr., and 12 yr. respectively.

10. The attendance at the Pan-American for one week in July was as follows: Monday 45,300, Tuesday, 46,800, Wednesday 38,150, Thursday 52,400, Friday 39,100, Saturday 71,200, and Sunday 21,000. What was the average attendance for the week?

1. $(56 \div 14) \times 12 - 12$ 2. $\frac{3}{4} - \frac{1}{8}$.

3. $\frac{3}{8} + \frac{3}{4}$.   4. $1\frac{1}{8} + 2\frac{1}{4}$.

5. $\frac{4}{5} + 1\frac{2}{3}$.   6. $\frac{5}{8} - \frac{3}{4}$.

7. How many eggs in 3 doz. 6 eggs?

8. How many pints in 1 gal. 1 qt.?

9. From a chest of tea containing 48 lb., there were sold 29 lb. 8 oz. How many pounds were left?

10. How many feet and inches in $\frac{5}{6}$ of a yard?

11. How many ounces are there in 75 one hundredths of a pound? In 75% of a pound?

12. What will be the cost of 48 lb. of coffee at 25¢ a pound?

13. I paid $12.75 for eggs at 25¢ per dozen. How many dozen did I buy?

14. How much will 99 yd. of dress goods cost at $33\frac{1}{3}$¢ a yard?

15. How many yards of cloth costing $33\frac{1}{3}$¢ a yard can be bought for $6?

16. What will be the cost of 24 yd. of carpeting at $1.25 a yard?

17. If eggs are sold at the rate of 18 for 25 cents, what will 3 doz. cost?

18. If $\frac{2}{3}$ of a yard of cloth cost 6 cents, how many yards can be bought for 72 cents?

19. If $1\frac{1}{2}$ pk. of nuts cost 48 cents, what will 1 quart cost?

20. What is the cost of 6 yd. of tape at 8¢ a yard, and 3 yd. of silk at $8 a yard?

21. $6 is $\frac{2}{3}$ of how many dollars?
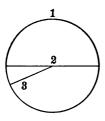
22. $50 - 12 - 9 - 19$.   23. $72 - 7 \times 9 = ?$

24. $(\frac{3}{4}$ of $80) + 15 = ?$ 25. $2\frac{1}{4} = $ —— fourths.

26. Add $1\frac{3}{4}$ and $\frac{1}{2}$.   27. $2\frac{1}{2} + \frac{1}{8} - \frac{1}{4} = ?$

28. If 4 yd. of muslin cost 48¢, how much will $\frac{1}{3}$ of a yard cost?

29. If you multiply 22 by 12, and divide the product by 3, what short method can you use?

To find circumference:

1. What is this figure called?

2. The circumference (1) is the distance round the circle, that is, it is the curved line bounding the circle.

3. The diameter (2) is a straight line passing through the center of the circle and touching the circumference on both sides.

4. The radius (3) is any straight line extending from the center to the circumference.

5. What part of the diameter is the radius?

6. Can you have more than one diameter in a circle?

7. Draw a circle. Draw two diameters at right angles to each other. Into how many parts does it divide the circle?

8. Can one circle have more than one radius?

9. Draw a circle on the board with a string 6 in. long for your radius. How long is your diameter?

10. Take a string 12 in. long (the length of your diameter), and see how many times you can use it to measure your circumference.

11. How many times the diameter is the circumference? It is about 3⅟ times.

12. From what you have just learned, tell how to find the circumference when the diameter is given.

13. If the path through the middle of a circular flower-bed is 14 ft., what is the length of a path round the outside?

14. If a circular pond is 28 ft. in diameter, what is its circumference?

15. If a park in the form of a circle is 35 rods across, how many rods is it round it?

16. If the diameter of the large wheel of an engine is 21 ft., what is its circumference?
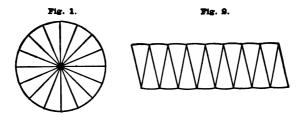
To find the diameter of a circle when the circumference is given.

1. The circumference is how many times larger than the diameter.

2. If the circumference is 3½ times larger than the diameter, how can you find the diameter when the circumference is given?

3. If the circumference is 22 ft., what is the diameter?

4. If it is 66 ft. round the outside of a circular flower-bed, how many feet is it across it through the center?

5. If the circumference of a circular fountain is 44 ft., how many feet long is the diameter?

6. If it is 88 in. round a circular table, how many inches is it from side to side through the center?

7. If it is 264 in. round a smoke stack, how many inches is the diameter of the stack?

8. The circumference is 198 ft.   Find the diameter.

9. Find the diameter of a circle whose circumference is 132 in.

10. How many feet long will be the diameter of a circle, if the circumference is 220 feet?

11. If the circumference is 154 ft., what is the diameter?

12. The circumference is 110 ft.   The diameter is ―― ft.?

13. How many yards will it be through the center of a circular park, if it is 242 yards round it?

14. If a fence round a circular field is 330 yd. long, how long is a fence running through the center that divides the field into two equal parts?

15. Find the diameter when the circumference is 396 in.

16. How many feet long will be the diameter of a circle, if the circumference is 363 ft.?

17. When the circumference is 176 ft., what is the diameter?

18. Find the diameter when the circumference is 198 ft.

19. Find the diameter when the circumference is 506 rd.

To find the area of a circle.

Fig. 1.   **Fig. 2.**
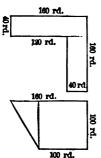
1. Take a paper disk, whose diameter is 7 in., cut it into 16 equal parts.   Arrange your parts like Fig. 2.

2. Into what shape, nearly, have you changed your circle?

8. If you had cut your circle into a greater number of parts, and arranged them as in Fig. 2, which figure would come the nearer to being a paralellogram?

4. Are there as many square inches in Fig. 2 as in Fig. 1?

5. The length of your rectangle (Fig. 2) was what of your circle (Fig. 1)?

6. The width of your rectangle was what of your circle?

7. How do you find the area of the rectangle (Fig. 2)?

8. If Figs. 2 and 1 have the same area, have you found the area of the circle?

9. State a rule for finding the area of circles.

10. What dimensions of the circle do you need to know?

11. Can you find any dimension when one is given?   How? Find the area of the following:

12. A circle whose diameter is 14 ft.

13. A circle whose circumference is 22 ft.

14. A circle whose radius is 14 ft.

15. A circle whose diameter is 21 ft.

16. A circle whose circumference is 66 ft.

17. A circle whose circumference is 110 ft.

18. A circle whose diameter is 63 ft.

1. Learn the following:

a. To find the circumference of a circle multiply the diameter by $3\frac{1}{7}$.

b. To find the diameter of a circle divide the circumference by $3\frac{1}{7}$.

c. To find the area of a circle multiply one-half of the circumference by one-half of the diameter, or multiply the circumference by one-fourth of the diameter.

2. If the circular flower-bed in your school-yard is 7 ft. in diameter, what is its circumference?

3. If the diameter of a circle is 105 ft., what is its circumference?

4. Find the circumference of a circle whose diameter is 21 inches.

5. Find the circumference of a circle whose diameter is 35 inches.

6. A wheel is 21 inches in diameter. Over how many feet of road will it move in making one revolution?

7. If the circumference of a circle is 22 in., how long is the radius?

8. Find the area of a circle whose circumference is 44 in. and diameter 14 in.

9. Find the circumference and area of a circle whose diameter is 28 ft.

10. Find the diameter and area of a circle whose circumference is 66 inches.

11. The earth's diameter is about 7924 miles. What is its circumference? How many hours would it take a train of cars to go round the earth at the rate of 44 miles an hour?

12. What is the area of a circular garden whose circumference is 198 rd.?

13. What is the area of a circle whose diameter is 35 inches?

1. If a man can do a piece of work in 15 days, what part of it can he do in one day?

2. If a man can mow a field of grass in 10 hours, what part of it can he mow in 1 hour?

3. If it takes 6 hours for a pipe to empty a cistern, what part of it can be emptied in 1 hour? In 2 hours? In 3 hours?

4. If a family consume a barrel of flour in 40 days, what part of a barrel do they consume daily?

5. If it requires 18 days to perform a journey, what part of it can be performed in 1 day? In 3 days?

6. If A can do a piece of work in 4 days, and B in 2 days, what part of it can each do in a day? What part can both do in a day?

7. If A can mow a field in 4 days, and B can do it in 8 days, what part of it can each do in a day? What part can both do in a day?

8. If A and B can do ¼ of a piece of work in a day, how many days will it take them to do the whole work?

9. How many days will it take to do the whole of a piece of work if ⅓ of it can be done in 1 day?

10. If William can do a piece of work in 3 days and John in 6 days, what part of it can each do in a day? What part can both do in a day? How long will it take them to do it all?

11. B had 4 apples more than A, and together they had 14.

12. Mary has 4 roses more than Martha, and both have 24.

13. Mary gave ⅔ of all her flowers to Ann, and has 4 remaining. How many did she give away?

14. If the diameter of a plate, is 7 in., what is the circumference?

15. If the diameter of a plate is 14 in., what is the circumference?

16. A lady cut 2⅓ yards of ribbon from a 10-yard roll.

160 rd.

40 rd

120 rd.

80 rd

40 rd

160 rd.

100 rd

100 rd.

1. Here is a diagram of Mr. Bardwell's farm. How many acres are there in it?

2. The second figure is a diagram of Mr. Morse's farm. Find how many acres he has.

3. Mr. Smith has 4 fields. The first field is 40 rd. square. The second field is 80 rd. long and 20 rd. wide. The third field is 100 rd. long and 16 rd. wide. The fourth field is 400 rd. long and 10 rd. wide. How many acres of land has Mr. Smith?

4. Find the perimeter of Mr. Bardwell's farm. Of each field of Mr. Smith's farm.

5. A farmer wishes to make a grain box 8 ft. long, 5 ft. wide, and 4 ft. deep. How many square feet of boards will be needed for the box?

6. The salary of the President of the United States is $50,000 a year. What is his salary for a day?

7. Find the cubic feet in 4 piles of wood, each 24 ft. long, 8 ft. high, and 4 ft. wide.

8. From a bin containing 30⅘ bu. of corn, 15¹¹⁄₄ bu. were taken out. How many bushels remained in the bin?

9. If 29¹²⁄₁₃ yd. are sold from a piece of muslin containing 48⅞ yd., how many yards are left?

10. A man spent $11⅞. If he had $15¾ at first, how much has he now?

11. One day in winter two boys were standing on the shore of a circular pond, 154 rd. in circumference. To reach a point directly opposite them, one boy went round by the shore, the other through the center. How much farther did one boy walk than the other?

12. How long is a freight-train of 36 cars, allowing 33 ft. for the length of each car and 2 ft. for the distance between the cars?

1. What per cent of a square foot is 96 square inches?
2. What per cent of a mile is 64 rods?
3. Wood costs me $6.75 a cord. What shall I ask for it to gain 20%?
4. If a merchant buys flour for $6.00 a barrel, and sells it for $7.20 a barrel, what per cent does he gain?
5. How much is left after spending 7% of $825?

NOTE. — Consider 7% as the decimal .07. All per cents not easily changed to such common fraction as $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, etc., should be considered as decimals. This involves no new principle.

6. Find 27% of $864.50.
7. Find 18% of $1,680.50.
8. Find 75% of 488 bushels.
9. Find 5% of 360 feet.
10. I bought a horse for $250 and sold him at a loss of 20%. How much did I lose?
11. I expended 75% of my salary and had $450 left. What was my salary?
12. What per cent of 250 is 50?
13. Find $2\frac{1}{2}$% of 4678. $3\frac{1}{3}$% of 3639.
14. Find 16% of $248. 24% of $678.
15. A merchant sold some goods for $18. If $3 of this was profit, find his gain per cent.
16. What is $12\frac{1}{2}$% of 270? $14\frac{1}{2}$% of 210?
17. A lawyer's commission for collecting money was $3\frac{1}{2}$%. He collected $460. How much of this money may he keep? How much should he pay to the man who employed him?
18. Find $23\frac{1}{2}$% of $624.
19. If a town of 1500 inhabitants gains in a year 4%, how many does it gain?
20. A school has 300 pupils and 95% are present. How many are absent?

1. Express as common fractions 10%, 20%, 25%, 50%, 33⅓%, 66⅔%, 75%, 60%.

2. What is 10% of $80? $40? $100?

3. What is 20% of $60? $75? $100?

4. What is 50% of 12 horses? Of $60?

5. What is 33⅓% of 18? 24? 30? 60? 90?

6. I bought 2 doz. eggs, but 25% were spoiled. How many were good?

7. A farmer raised 50 bu. of corn, and sold 20% of it.

8. How many gallons of molasses were left in a hogshead, containing 63 gal., after 33⅓% had been sold from it?

9. There are 400 boys and girls in a school. How many are there of each sex if 50% are boys?

10. A man bought a horse, agreeing to pay 25% of the price every month. How many months will it take him to pay the whole bill?

11. A received 20% of $100, and B received 25% of the same sum. Which received the most, and how much more?

12. What per cent of 80 is 20? Of 20 is 10? Of 40 is 8? Of 60 is 20?

13. 7 is what per cent of 14? Of 28? Of 35? Of 21? Of 70?

14. A boy had 12 cents, and spent 3. What per cent did he spend? What per cent did he have left?

15. A man having $50, paid $10 for a coat. What per cent of his money did he spend?

16. If I buy a watch for $10, and sell it for $15, how many dollars do I gain? This is what per cent of the cost of the watch?

17. 20 is 10% of what number? 25 is 25% of what number? 50% of what?

18. A man paid $400 toward a house, and the sum paid was 10% of the sum asked. What was the price of the house?

Writing numbers by means of characters is Notation.

Reading numbers written in characters or figures is Numeration.

We use the Arabic system of Notation, so called because the Arabs are supposed to have introduced these characters into Europe.

The system employs ten characters called figures.

For convenience in reading and writing numbers, the figures of a number are divided into periods of three figures each.

Hundred Millions.	Ten Millions.	One Million.	Hundred Thousands.	Ten Thousands.	One Thousand.	Hundreds.	Tens.	Units.	Tenths.	Hundredths.	Thousandths.	Ten-thousandths.	Hundred-thousandths.	Millionths.
4	6	8	7	6	8	4	7	5	6	4	8	7	9	1

4 6 8 , 7 6 8 , 4 7 5 . 6 4 8 , 7 9 1

NOTE. — The fourth period is called billions, the next trillions, and the third period of decimals is called billionths.

1. Read the following:

105,436,163.003,204.   468,242,039.206 075.

4,609.00108.   5,073.001406.

200,173.40062.   4,000.0004.

50,000.0005.   1,080.0076.

NOTE. — Do not use *and* in reading whole numbers. In reading, *and* takes the place of the decimal point.

Write:

2. Three hundred million, ninety thousand, four, and seventy-six thousandths.

3. Five hundred thirty-eight million, two hundred ten thousand, nine hundred fifty-three, and one hundred six ten-thousandths.

1. Name the periods in order from units to millions.

2. Name the places in order from units to millions, and from units to millionths.

3. Write:

Three million, forty thousand, two hundred four; two hundred thousand forty; twenty thousand one hundred one; sixteen thousand ten.

4. Write:

Three million, seventy-one thousand, seventy and twelve thousandths; six hundred thousand, seven hundred forty-eight, and five ten thousandths; forty-nine thousand eight and one hundred five millionths; three hundred sixty thousand twenty-eight and twenty-five hundred thousandths; thirty million two hundred seven thousand forty-three and twenty-one hundredths.
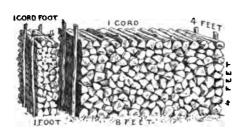
5. Read the following numbers:

401,420,401.004.	64,064,640.0064.
60,600,060.0606.	55,055,505.055.
300,700,600.0605.	200,142,061.0402.
92,084,146.00075.	610,203,241.604.

Write in figures:

6. Six million, six thousand, six and six millionths.

7. Eight hundred forty million, four hundred six thousand, two hundred six and one hundred twenty-four ten-thousandths.

8. Multiply eighty thousand nine hundred seventy-six by twenty thousand eight.

9. Multiply thirty-four thousand, eighty-six by ten thousand three hundred six.

10. Divide nine million, eight hundred sixty-one thousand, five hundred fifty-seven by four thousand sixty-nine.

11. Divide two million, seven hundred seventy-four thousand, five hundred thirty-eight by eight thousand three hundred seven.

1. 16 is ⅔ of what number? ⅖ of what number?

2. 28 is ⅘ of what number? ⅐ of what number?

3. 20 is ⅔ of what number? ⅘ of what number?

4. 18 is ⅔ of what number? ⅔ of what number?

5. If ⅘ of a ton of coal is worth $8, what is the price of 2 tons?

6. 9 is ¾ of what number? 12 is ⅔ of what number?

7. At 25¢ a dozen, how many dozen lead pencils can be bought for $4?

8. How many bushels of pears can be bought for $5, at 50¢ a bushel?

9. If cloth is 48¢ a yard, what must I pay for ¾ of a yard?

10. How many square yards in a square rod?

11. 9 square yards equal how many square feet?

12. How much have I left out of $8¾ after spending $6¼?

13. I bought a book for $\frac{7}{11}$ of a dollar, and sold it for $\frac{8}{11}$ of a dollar. Did I gain or lose? and how much?

14. ½ equals how many fourths? How many sixths? Eighths? Tenths?

15. ⅓ equals how many sixths? How many ninths? Twelfths?

16. At $⅔ a day, what will a boy earn in a week?

17. How many cubic yards of earth were taken out in digging a cellar 10 yd. × 8 yd. × 2 yd.? What did it cost to dig it at 10¢ a cubic yard?

18. $40 is equal to ⅓ of my house rent for 1 year. How much do I pay a month?

19. How many sheets of paper are there in a quire? In ¼ quire? In ¾ quire?

20. How many quires are there in 3 reams? In 5 reams?

21. How many quires are there in ½ a ream? In ¼ ream?

22. John earned 30 cents, and his father gave him 20 cents. How many bats at 10¢ each can he buy with all his money?

Wood is generally prepared foi the market by cutting the sticks each 4 ft. in length. These are laid in piles, so that the length of the stick is the width of the pile. In the picture, the larger pile represents a cord. See how long, wide, and high it is. How many cubic feet are there in it? The smaller pile represents a cord foot. See how long, wide, and high it is. What part of a cord is it?

cd. stands for cord or cords.

cd. ft. stands for cord feet.

1. Find the number of cubic feet in a pile of wood 8 ft. long, 4 ft. wide, and 4 ft. high. How many more cubic feet does this pile need to make a cord?

2. Find the number of cubic feet in a pile of wood 4 ft. long, 4 ft. wide, and 4 ft. high. Is this a cord? What part of a cord is it?

3. Find the number of cubic feet in a pile of wood 16 ft. long, 4 ft. wide, and 4 ft. high.

4. Find the cubic feet in a pile of wood 10 ft. long, 8 ft. wide, and 6 ft. high.

5. A pile of wood is 1 ft. long, 4 ft. wide, and 4 ft. high. How many cubic feet are in the pile? What part of a cord is it?

6. A pile of wood is 8 ft. long, 4 ft. wide, and 8 ft. high. How does its length compare with the length of a cord of wood? How do the widths compare? The heights? How many cords are there in the pile?

7. Make an example about a pile of wood.

To illustrate this lesson there should be a model of a cubic foot and a cubic yard for examination.

1. Take the cubic foot. How long is it? How wide is it? How high is it? How many cubic inches are there in it?

2. A cubic yard is how long? How wide? How high? How many cubic feet then are there in it?

3. Learn this:

1728 cubic inches (cu. in.) 1 cubic foot (cu. ft.)

27 cubic feet   1 cubic yard (cu. yd.)

4. Find the number of cubic feet of water in a rectangular cistern 12 ft. long and 9 ft. wide, if the water is 7 ft. deep.

5. How many two-inch cubes are there in a rectangular block of marble 2 ft. long, 18 in. wide, and 12 in. thick?

6. How many cords in 640 cubic feet?

7. How many cords in 2 piles of 4-foot wood 16 ft. long and 8 ft. high? What is it worth at $6.25 a cord?

8. What will a pile of wood 12 ft. by 6 ft. by 4 ft. cost at $8 a cord?

9. What must I pay for a pile of 4-foot wood 6 ft. high and 12 ft. long at $6 a cord?

10. How many cords can be piled on a car 18 ft. long, 8 ft. wide, and 7 ft. high?

11. How many cubic feet of earth will be removed in digging a cellar 20 ft. long, 15 ft. wide, and 19 ft. deep? If a cubic yard makes a load, how many loads are there?

12. Compare a 4-foot cube with an 8-foot cube in length, surface, and contents.

13. What part of a cord is 96 cu. ft.?

14. Find the cost of digging a cellar 48 ft. long, 30 ft. wide, and 6 ft. deep, at 18¢ a cubic yard, and of flooring it with cement at 12¢ a square yd.

1. How many months in ⅔ of a year? ¾ of a year? ⅝ of a year?

2. How many hours in ⅝ of a day? ⅛ of a day? ₇⁄₁₂ of a day?

3. How many months in .25 of a year? In .33⅓ of a year?

4. What part of a day is 6 hours? 9 hours? 12 hours?

5. How many square inches in the surface of a brick 8 in. long, 4 in. wide, 2 in. thick?

6. What per cent of $50 is $5? $10? $25?

7. If a merchant bought a piece of cloth for $80, and sold it at 25% profit, for how much did he sell it?

8. A merchant bought hats at $5 each, and sold them at 20% profit. What was the selling price?

9. A merchant bought hats at $5 each, and sold them at a loss of 20%. What was the selling price?

10. When cloth, costing $5 a yard, is sold for $4 a yard, what is the loss per cent?

11. If a merchant sells cloth, costing $4 a yard, for $5 a yard, what per cent does he gain?

12. If a man sold shoes at a profit of $2 a pair, and gained 20%, how much did they cost?

13. How must muslin that costs 10 cents a yard be sold to gain 20%? That costs 15 cents? 20 cents?

14. ⅔ of 27 is ⅜ of what number?

15. ⅝ of 81 is ₁⁰⁄₅ of what number?

16. ⁴⁄₇ of 21 is ¾ of what number?

17. 18 is ⅜ of how many?

18. 24 is ⅝ of how many?

19. 40 is ⅝ of how many times ⅖ of 10?

20. If 4 chickens cost 9 dimes, what will 1 chicken cost?

21. What will 1 lb. of prunes cost if 5 lb. cost 48 dimes?

22. If 3 apples cost ⅖ of a cent, what will 7 apples cost?

New Haven, Feb. 1, 1902.

JOHN JAMES,

Bought of N. Y. FURNITURE CO.

Jan.	25	36 yd. Ingrain Carpeting, @ 85¢,	$30	60		
"	25	48 yd. Brussels Carpeting, @ $2.80,	134	40		
"	25	1 Chamber Set,	75	00		
"	25	1 Parlor Set,	175	00	415	00
		Received payment,				
		N. Y. Furniture Co.				
		Per Smith.				

1. In the above bill who bought the goods? Who sold them?

2. When and where was the bill made out? When were the articles bought?

3. Has the bill been paid? Who must sign it, or receipt it? What was the name of the book-keeper who receipted the bill for the company?

4. Read the first item of the account. What was bought? How many yards? What was the price per yard? What does @ stand for? Does the $.85 following the @ mean the price of *all* or the price of *one?* What was the whole cost of the first item?

5. Answer the same questions for each of the following items of the bill.

6. Notice carefully where every part of each item is placed.

7. Make out a bill and receipt it when M. H. Merron buys of J. D. Moore, 1 bag meal, $1.76; 15 lb. gran. sugar, @ 7¢; 3 lb. raisins, @ 22¢; 3 gal. molasses, @ 67¢; 4 lb. tea, @ $1.25.

8. When anyone buys goods of another, the one who buys or receives the goods is called the debtor (Dr.), and the one of whom the goods are bought is called the creditor (Cr.). Name the debtor and creditor in the examples in this bill.

New Haven, Feb. 1, 1902

JOHN JAMES,

To the N.Y. FURNITURE CO., *Dr.*

Jan.	25	To 36 yd. Ingrain Carpeting @ $.85,	30	50		
"	25	To 48 yd. Brussels Carpeting @ $2.80,	134	50		
"	25	To 1 Chamber Set,	75	00		
"	25	To 1 Parlor Set,	175	00	415	00
		Received payment,				
		N. Y. Furniture	Co.			
			Per	Smith		

1. How does the heading of this bill differ from that on page 168?

2. With what word does each item begin when this form is used?

Use this form in the examples in this lesson, and make out bills.

3. Mr. Lyman Smith, on Nov. 1, 1902, bought of Smith and Howard, 50 lb. coffee sugar @ 6¢; 10 lb. Java coffee @ 35¢; 4 lb. oatmeal @ 5¢.; 8 doz. eggs @ 20¢; 4 gal. molasses @ 70¢; 50 lb. butter @ 25¢; 2 doz. lemons @ 25¢.

4. John Osgood, on Aug. 2, 1902, bought of R. H. Macy, 6 bbl. of pork @ $22.00; 431 lb. ham @ 17¢; 286 lb. beef @ 10¢; 362 lb. bacon @ 11¢; 18 bu. beans @ $2.00.

5. June, 1902, Chas. Brewer sold H. E. Tucker 10 bbl. rye flour @ $6.00; 40 bbl. St. Louis flour @ $7.00; 100 bu. corn @ $1.00; 100 bu. wheat @ $0.90.

6. June 14, 1902, J. H. Conner sold to W. T. Collins, 80 bu. yellow corn at 80¢; 100 bu. of rye @ $0.60; 200 bu. oats @ 30¢; 10 bbl. rye flour @ $6.00.

7. May 3, 1902, Chas. O. Ramsey sold to W. A. Bailey, 1 book-case, $29.00; 1 cottage bedstead, $4.50; 1 black walnut extension table, $19.00; 24 yd. stair carpeting @ 62¢; 1 hall mat, $3.50; 25 yd. Brussels carpeting @ $1.25.

Write the following bills, using either form:

1. May 17, 1902. Geo. W. Howe, Cr. J. O. Hancock, **Dr.** 8 yd. crash @ 20¢; 1 table-cover, $1.20; 40 gal. molasses @ 62¢; 4 gal. linseed oil @ $1.00; 25 lb. lead @ 13¢; 50 lb. of dried apples at 13¢.

2. James L. Davis bought on May 10, 1902, of Benj. B. Webb, 1 bbl. flour, $6.50; 8 bu. meal @ 90¢; 1 bbl. sugar (196 lb.) @ 8¢; 28 gal. molasses @ 62¢; 4 bu. potatoes @ 60¢; 10 bu. of corn @ 75¢.

3. Fred Williams bought of J. Jackson & Co., Apr. 6, 1902, 2 pairs boy's boots @ $5.00; 1 pair ladies' kid boots @ $4.00; 1 pair rubber boots @ $4.00.

4. Joseph Hanson sold Samuel Bennett, on April 23, 1902, 2 cd. pine wood @ $3.00; 245 ft. lumber @ $3.25 per C.; 75 cd. hard wood @ $5.75.

5. April 21, 1902, John M. Flanders bought of Henry O. Turner 1 blank book, 30¢; 1 arithmetic, $1.25; 1 slate, 31¢; 4 quires paper @ 15¢; 19 yd. border @ 5¢.

6. Fred Bruce bought of H. W. Longley, Mar. 4, 1902, ½ bu. of apples @ 60¢; 2 bu. potatoes @ 63¢; 6 lb. butter @ 35¢, ½ bu. onions, 45¢; 4 cabbages @ 5¢; 3 lb. honey @ 32¢.

7. Mrs. James Shields bought of Henry Morse on April 15, 24 yd. cloth @ $3.80; 15 yd. velvet @ $4.50; and on May 10, 48 yards silk @ $3.50; 27 yd. cassimere @ $1.36. Send her bill on June 1.

8. Make out the following bill, supplying names and date; 3¾ lb. tea @ 60¢; 200 lb. sugar @ 4¾¢; 45 yd. print @ 9½¢; 33 lb. cheese @ 15¢.

8. Make out a bill against your teacher that shall include five items of goods bought at a grocery store. Also one of goods bought at a market.

10. Make out a bill against a classmate of five items of goods bought at a dry-goods store.

1. Compare a cubic foot and a cubic yard.

2. How many pieces of ribbon ⅜ yd. long can be cut from 9 yards?

3. How many inch cubes will a 2-in. cubical box hold? A 4-in. cubical box?

4. At $2 a thousand, what will 1,500 cu. ft. of gas cost?

5. 32 pounds is 33⅓% of George's weight. What is his weight?

6. Find the cost of:

    ⅜ yd. of cloth at 12¢ a yd.   8½ lb. beef at 12¢ a lb.

    1¾ yd. ribbon @ 18¢ a yd.   6 lb. steak @ 16¾¢ a lb.

7. How many square yards in a tablecloth 72 in. wide and 4½ yd. long?

8. What per cent of a 2-in. square is a square inch? Are 2 square inches?

9. What per cent of a 2-in. cube are 2 cubic inches?

10. What part of 24 is 18? What per cent is it?

11. A boy had 20 cents and lost 16 cents. What part of his money had he left? What per cent had he left?

12. If in an arithmetic test you answer correctly 8 questions out of 10, what part do you have right? What per cent do you have wrong?

13. What per cent of the months have 30 days?

14. 12 cents is 4% of Jennie's money. How much money has she?

15. 12 is ¼ of what number?

16. 12 is 25% of what number?

17. 12 is .25 of what number?

18. 21 is 7% of what number?

19. 21 is .07 of what number?

20. What is 9% of 200? 600? 3,000?

21. What is 66⅔% of 12? 36? 300?

22. Find the perimeter of a square 2 ft. 4 in. long.

23. What will 2 lb. 2 oz. of butter cost at 32¢ a pound?

1. A man having 500 bu. of wheat sold 8% of it. How many bushels did he sell?

2. Mr. Brown's expenses were $75.75 in January, $80.35 in February, $72.62 in March, $84 in April. What were his average expenses a month? At the same average, what would be his expenses for a year?

3. Change these decimals to common fractions and add them:

.5,   .75,   .625,   .80,   .05,   .20.

4. Divide 846.45 by 4.5.

5. Divide 723.45 by 10; by 100; by 1000.

6. Multiply 72.345 by 10; by 100; by 1000.

7. A man bought a load of hay for $18.75, another for $13.25. He sold the two loads for $35. Find the gain.

8. Mr. H. bought 5 houses. The first cost $4,357.25; the second $1,307.50; the third $3,800; the fourth $4,682.75; the fifth $2,000. Find the average cost.

9. How many barrels of flour at $5¼ a barrel can be bought for $165?

10. If a train of cars can run 496⅔ miles in 12 hours, how many miles can it run in 1 hour?

NOTE. — Do not change to fifths before dividing.

11. Last month a man earned $121. This was $\frac{11}{10}$ of what he earned the month before. How much did he earn during both months?

12. How many cords of wood in a pile 60 ft. long, 4 ft. wide, and 8 ft. high? What is it worth at $5.25 a cord?

13. 54 cd. of wood at $4.60 a cord are worth how much more than 135 doz. eggs at 27¢ a dozen?

14. Find the square feet in the following rectangles:

12 ft. by 15 ft.   19 ft. by 23 ft.   18 ft. by 16 ft.

14 ft. by 17 ft.   11 ft. by 15 ft.   15½ ft. by 12 ft.
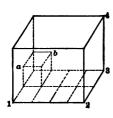
1. Make out the following bill: Robert J. Wilder bought of J. H. Smith 64 lb. sugar @ 4½¢, 25 lb. lard @ 6½¢, 34 lb. coffee @ 33¢, 1 bbl. flour, $5.75, 14 gal. molasses @ 22½¢.

2. Find the sum of 7⅓, 8⅜, 9¼, 7⅘, 8⅞.

3. What will 78 acres of land cost if 13 acres cost $1,625?

·4. Divide ⅝ by 15.

5. Add 7.85, 46.068, 9.8, .875, 78.94, 6.59.

6. How many square feet are there in the walls and ceiling of a room 17 ft. long, 14 ft. wide, and 10 ft. high?

7. Find the number of cubic feet of air in a room 14 ft. long, 11 ft. wide, and 9 ft. high.

8. 128 is ⅔ of what number?

9. Divide 31.5 by .126. ,

10. Multiply .078 by .0009.

11. If 18 men can do a piece of work in 42 days, how long will it take 21 men to do the same work?

12. What is the cost of 64 sheep, if 18 cost $198?

13. ⅞ of an acre of land is sold for $140. What is the price of an acre?

14. At 50¢ a square yard, what is the cost of carpet to cover a floor 18 ft. long and 15 ft. wide?

15. Find the number of square inches in one pane of glass in the schoolroom window. In all the panes in one window. In all the panes in all the windows.

16. John earns $4.80 in a week. How much can he earn in 5 wk. 4 days? How many days will it take him to earn $16.80?

17. If a milk can holds 14 gal. 3 qt. 1 pt. of milk, how many pints does it hold when full?

18. Subtract:

64½	99⅓	87½	15½	20½
5¼	27¼	49½	8¼	11¼

19. Subtract:

13½	81¼	93¼	47⅞	68⅝
5¼	36½	83½	23½	47½

1. Mr. Smith having a pound of candy, said, "I will give Nellie ⅓, and Jennie ⅓, and George ⅓, and the rest shall go to Charles, if he can tell how to divide it." If you were Charles, how would you divide it?

2. If you had a quart of chestnuts, and wanted to give ½ to one boy, ¼ to another, and ⅛ to another, how would you do it without dividing the quart into eighths?

3. If ½ of a barrel of beans cost $2¼, how much will a barrel cost?

4. If ⅓ of a barrel of pork costs $4⅓, what will 1 barrel cost?

5. 12 is ⅔ of what number? 10 is ⅝ of what number?

6. If a peck of potatoes lasts a family 2 weeks, how many weeks will 2 bushels last them?

7. Bought an orange for 4 cents, and sold it for 6 cents. What was the gain per cent?

8. A merchant bought a hogshead of molasses for $80, and sold it for $95. What did he gain per cent?

9. Two boys had each an equal number of blocks. One lost 4, and then together they had 12. How many had each at first?

10. George, after eating ⅓ of all his oranges, had 8 remaining. How many had he at first?

11. A pole is standing in the water so that 15 feet are above the water. If the part above the water is ⅔ of the length of the pole, how long is the pole?

12. If 8 horses in one day eat 4 bu. of oats, in how many days can one horse eat 1 bushel?

13. ⅝ of 72 is ⅔ of how many?

14. ⅝ of 12 is ⅔ of how many?

15. ¾ of 20 is ⅔ of how many?

16. ⅝ of 20 is ⅔ of how many?

17. If 6 men can do a piece of work in 8 days, how many men can do it in 16 days? In 4 days?

1. How many cubic inches in a box 4 in. long, 2 in. wide, and 3 in. high? Make a drawing that will represent the number of inch cubes in one row of the bottom layer.

1–2 represents the length of the box, 2–3 the width, 3–4 the height. *a–b* represents one block in the lower layer. Can you see how many blocks there would be in a row? In a layer?

2. Make similar illustrations to show the number of cubic inches in a box 8 in. long, 6 in. wide, and 4 in. high.

3. Also for a box 6 in. long, 6 in. wide, and 6 in. high.

4. Using scale 1 in. to a foot, illustrate cubic feet in a box 9 ft. long, 7 ft. wide, and 5 ft. high.

5. Using same scale illustrate the surface of this box.

Find the number of cubic inches in a rectangular solid :

6. 12 in. long, 8 in. wide, 4 in. thick.

7. 8½ in. long, 4 in. wide, 3 in. thick.

8. 7 in. long, 6½ in. wide, 4 in. thick.

9. 9 in. long, 6 in. wide, 3½ in. thick.

10. 14 in. long, 12 in. wide, 9 in. thick.

11. How many 4-inch cubes will a box hold that is 1 ft. 4 in. long, 12 in. wide, and 8 in. high?

12. How many blocks 3 in. by 2 in. by 1 in. can be placed in a box, whose inside measurements are 15 in. by 10 in. by 7 in.?

13. A pile of wood is 40 ft. long, 8 ft. wide, and 6 ft. high. How many cords does it contain?

14. A room is 21 ft. long, 18 ft. wide, and 8 ft. high. How many cubic feet of air does it contain?

1. A man bought 225 acres of land at $15 an acre, and sold the whole for $3,125.

2. Bought a farm for $3,695, spent $947 in improvements, and sold it for $4,267.

3. Jones lost $400, and had ⅝ of his money remaining.

4. Bought 5 bu. of apples at 62½¢ a bushel, and sold them at 12½¢ a peck.

5. A rectangular lot is 16 yd. long, and 39 ft. wide.

6. A man sold a horse for $80 and lost 20%.

7. The diameter of a circle is 21 ft.

8. The circumference of a circle is 66 ft.

9. ⅞ of a barrel of flour cost $4.20.

10. A square contains 100 sq. in.

11. An excavation 7 ft. deep was made for the cellar of a house 40 ft. long, 25 ft. wide.

12. The distance round a rectangular lot is 24 rd. The lot is twice as long as it is wide.

13. The distance round a rectangular lot is 54 rd. The length of the lot is 15 rd.

14. A cube measures 8 in. on a side.

15. A rectangular solid is 12 in. long, 11 in. wide and 10 in. deep.

16. A. O. Strong bought of D. L. Day 76½ lb. of butter @ 22¢; 46 doz. eggs at 22½¢; and 24 bbl. of apples @ $1.75.

17. The altitude of a triangle is 6 ft. 6 in. and its base is 10 ft.

18. A picture frame is 2½ inches wide. The picture inside of the frame measures 24 in. by 18 in.

19. A man left ½ of his property to his wife, ⅓ to his son and the remainder to his daughter. The daughter received $5000.

20. The surface of my office desk is 10 square feet. The desk is 4 ft. long.

1. How many are ⅜ of $40 ?
2. How many are 40 × ⅜ ?
3. How many are 60 % of 40 ?
4. What per cent of 10 yd. is 3 yd.? 5 yd.? 7 yd.?
5. What is 25 % of 460 pounds?
6. What is 7 % of 600 bushels? First find 1 %.
7. What is 8 % of 1000 rods? First find 1 %.
8. From a school of 750 pupils 20 % were absent. How many were present?
9. What per cent of 150 is 30 ?
10. What per cent of 18 is 6 ?
11. A man bought a farm of 200 acres, and sold 50 acres of it. What per cent of his farm did he sell?
12. A man bought a cow for $35, and sold her at 20 % profit. How much did he gain? For how much did he sell her?
13. A grocer bought flour at $4 a barrel, and sold it at 25 % loss. How much did he lose? For what did he sell it?
14. Bought a horse for $200, and sold it for $50 less than cost. What part did I lose? What per cent did I lose?
15. If you buy tea at 60¢ a pound, and sell for 80¢ a pound, how many cents will you gain? What part will you gain? What per cent?
16. If you buy a rubber ball for 8 cents, and sell it for 6 cents, how many cents will you lose? What part will you lose? What per cent?
17. If you buy an orange for 4 cents, how many cents must you gain to make 50 %?
18. One man can earn $10 in one week. What is true of 5 weeks? 12 weeks? 20 weeks? 8 men? 12 men? 20 men?
19. A trunk that cost $9 sold for $15. What was the per cent of gain?
20. 6 times 10 and ⅜ of 10 are how many?

1. A man owns a farm of 150 acres. If he planted 30% of his farm, how many acres did he plant?

2. A man bought a horse for $180 and sold it so as to gain 10% of its cost. What did he gain?

3. An agent sold a house for $3600. If his commission was 4%, how much did he receive?

4. A merchant bought an article for $12 and sold it for $15. How much did he gain? What part of the cost did he gain? What per cent did he gain?

5. A man, having 400 bushels of wheat, sold 50 bushels. What part of his wheat did he sell? What per cent did he sell?

6. Mr. Brooks received a salary of $2400. If he spent $16\frac{2}{3}$% of it for board, what did he spend for board?

7. After paying for his board Mr. Brooks spent 25% of what was left of his salary for other expenses. What did he pay for other expenses? How much of his salary had he left?

8. Find $62\frac{1}{2}$% of $486.

9. Find 96% of 265 bushels of oats.

10. A man bought a farm for $3200 and sold it at a loss of 16%. How many dollars did he lose?

11. A man bought 600 tons of coal at $3 a ton. How much did he pay for it? He sold it so as to gain 25%. For what did he sell it?

12. An agent sold 675 bu. of potatoes at 60 cents a bushel. What was his commission at 5%?

13. There are 1550 inhabitants in a town. 2% died in one year. How many died?

14. A wagon that cost $48 was sold for $60. How much was gained? What part of the cost was gained? What per cent was gained?

15. If a man sells anything at half of its cost, what per cent does he lose?

·To multiply and divide when multipliers and divisors have ciphers at the right.

Multiply 24 by 1,200.

```
      24
    1200  .
    ────
      48
    24
    ─────
   28800
```

Divide 2,899 by 1,300

```
               2.23
    13.ØØ ) 28.99
            26
            ──
            29
            26
            ──┐
              39
              39
              ──
```

1. Multiply 4,763 by 2,000; by 1,200.

2. Divide 64,782 by 2,000.

3. Divide 46.0076 by 400.

Multiply:

4.	**5.**	**6.**
794 by 400	9,797 by 4,000	1.06 by 200
789 by 300	6,468 by 8,000	5.078 by 60
988 by 700	1,895 by 6,000	9.248 by 1,000
776 by 500	6,759 by 9,000	63.75 by 400

Divide:

7.	**8.**	**9.**
3,840 by 120	3,600 by 1,800	7,980 by 190
145,600 by 1,300	53,040 by 170	6,001 by 1,700
28,990 by 130	760,000 by 1,900	95,040 by 45,000
282,500 by 2,500	316,800 by 2,400	4,899 by 230

Divide:
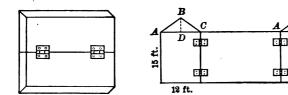
10.	**11.**	**12.**
21.204 by 190	35.53 by 170	40.00 by 240
36.04 by 20	62.004 by 30	31.80 by 1,060
25.032 by 300	20.40 by 800	1.500 by 450
.081 by 90	39.20 by 2,800	8,400 by 6,300
9.6 by 80	26.46 by 60	920 by 50
7.56 by 60	9.35 by 500	124.8 by 600

1. How many square feet in a blackboard 8 ft. long and 3½ ft. wide?

2. In 20 qt. how many gallons?

3. How many quarts in 5 pk.?   9 pk.?

4. A man laid out $50 in vests, which were $5 each.   How many did he buy?

5. 16 is ⅔ of what number?

6. Add 7 to 15; divide by 11; multiply by 9; add 10; divide by 7; multiply by 12; add 11; subtract 4; divide by 5; multiply by 8; give result.

7. Multiply 8 by 7; subtract 6; divide by 10; multiply by 9; add 11; divide by 8; multiply by 9; subtract 3; add 30; subtract 7; result.

8. Divide 39,467 by 1,000.

9. Divide 48,000 by 1,000.

10. 5 cents is 10% of the money in my pocket.   How much money have I?

11. If a line is 5 in. long, how long will it be when 20% has been added to its length?

12. 8 is 12½% of what number?

13. A merchant sells 21 yd. of silk for a dress.   How many yards are in a piece from which he can sell 4 dresses?

14. A man had 96 hens; he sold 84.   What part of the whole number had he left?   What per cent had he left?

15. 28 qt. of berries are worth how much at $1.00 a peck?

16. If 2 yd. of silk cost $4, what will 16 yd. cost?

17. How many inches are there in one-half of a square foot?

18. Which is larger, a flower bed that contains 3 square feet, or one that is 3 ft. square?   How much larger is it?

19. At 10¢ a quart, how many pecks of nuts can be bought for 80 cents?

1. Multiply 184 by 7¾.

2. Write bills for the following sales, supplying names and dates. Receipt them: 12 bbl. flour @ $6.25; 160 bu. wheat @ $.83; 80 bu. corn @ $.75; 186 doz. eggs @ 18¢; 146 lb. beef @ 12½¢.

3. 24 yd. muslin @ 9¢; 8 yd. ribbon @ 42¢; 3 doz. buttons @ $.25; 12 yd. silk @ $1.25.

4. At $3½ a rod what will it cost to fence a rectangular lot 74 rods by 68 rods?

5. Add: ⅘ + ½⅐ + ⅔ + ⅘.

6. The highest mountain peak in North America is 19,000 ft. high; in South America, 23,910 ft.; in Europe, 18,526 ft.; in Asia, 29,002 ft.; in Africa, 19,600 ft.; in Oceania, 13,760 ft. What is the height in miles of each of the peaks?

7. A farmer raised 185 bu. of corn this year, twice as many last year, and the year before last twice as many as last year and this year together. How many bushels did he raise the year before last?

8. 50⅜ − 23⅘.

9. Change 4 bu. 2 pk. 7 qt. to quarts.

10. ⅓ of one number is 639, and 6 times another number is 612. Find the sum of the two numbers.

11. Find the number of square inches in a piece of paper 7 ft. long and 9 inches wide.

12. How many inch cubes can be put into a box 28 in. long, 17 in. wide, and 13 in. deep?

13. 128 is ⅘ of what number?

14. A man paid $465 for a span of horses, and $185 less for a carriage. Find the cost of both.

15. How many dozen are there in 45 score?

16. Find the value of a pile of bark 140 ft. long, 36 ft. wide, and 16 ft. high at $2.45 a cord.

1. Rule paper and fill out bill for 12 bu. corn @ 65¢; 25 bbl. flour @ $5.25; 16 bu. wheat @ $1.12; 23 bu. rye @ 83¢.

2. Find 16 % of $413.50. Of $469.47.

3. Find 65% of 34,821. Of 3047.2.

4. If you had $1,560 in a bank, and should draw out 35% of it, how much would remain in the bank?

5. I buy oranges at 18¢ a dozen, and sell them at the rate of 3 for 6 cents. What is my profit on a dozen oranges? On 120 oranges?

6. What will it cost to pave a cellar 16 ft. 6 in. long by 12 ft. wide, at 80¢ a square yard?

7. A circular piece of land has a diameter of 84.7 ft. What is its area?

8. How many square inches in the outside surface of a box 8 ft. long, 4 ft. 6 in. wide, and 2 ft. high?

9. A square pyramid has a base of 10 ft., and a slant height of 8.6 ft. Find the area of its entire surface.

10. A piece of land is 16 rd. long, and 165 ft. wide. What is it worth at 12¢ a square foot? What will it cost to fence it at 75¢ a yard?

11. A lady paid $62 for 15½ yd. of silk. What was the silk a yard?

12. A drover paid $18¼ for 5 sheep. How much was that a head?

13. A dealer exchanged 88 pairs of shoes at $2, and 110 pairs of boots at $9 a pair for coal at $5.50 a ton. How many tons did he receive?

14. Make out a bill that shall include six items of articles bought of your grocer.

15. Suppose you were working in a shoe-store, and your teacher bought of you a pair of shoes, a pair of rubbers, and a pair of slippers; make out her bill.

1. How many square inches in a square that is —— inches on a side? How many square inches in a square that is —— inches more on a side? How many square inches in both squares?

2. I bought —— ounces of candy; what part of a pound did I buy?

3. What number is —— more than ——?

4. A bin held —— bushels of potatoes, how many pecks were there?

5. A rectangle is —— inches wide, and twice as long as wide. What is its perimeter?

6. I have —— apples, and my brother has ——. How many must I give my brother that we may have the same number?

7. A book and a picture cost $——. If the book cost $——, what did the picture cost?

8. Find —— per cent of ——.

9. Find —— per cent of ——.

10. If I use —— sheets of paper, what per cent of a quire do I use?

11. If I buy shoes for $—— a pair, and sell them for $—— a pair, what per cent do I gain?

12. If a man buys a watch for $——, and sells it for $——, what per cent does he lose?

13. If you buy a knife for ——, for how much must you sell it to gain —— %?

14. Add: $4\frac{1}{2}$ $5\frac{1}{4}$ $7\frac{1}{2}$ $7\frac{1}{4}$ $9\frac{1}{2}$ $6\frac{1}{8}$.

   $3\frac{1}{4}$ $3\frac{1}{4}$ $9\frac{1}{8}$ $8\frac{1}{12}$ $8\frac{1}{8}$ $4\frac{1}{12}$

15.

$\frac{1}{2} + \frac{1}{4} = \frac{}{4}$? $\frac{1}{4} + \frac{1}{4} = \frac{}{8}$? $\frac{1}{2} + \frac{1}{3} = \frac{}{6}$?

$\frac{1}{2} + \frac{1}{8} = \frac{}{8}$? $\frac{1}{2} + \frac{1}{5} = \frac{}{10}$? $\frac{1}{2} + \frac{1}{7} = \frac{}{14}$?

$\frac{1}{2} + \frac{1}{9} = \frac{}{18}$? $\frac{2}{3} + \frac{1}{3} = \frac{}{6}$? $\frac{3}{4} + \frac{1}{4} = \frac{}{12}$?

$\frac{2}{3} + \frac{1}{5} = \frac{}{15}$? $\frac{1}{2} + \frac{1}{8} = \frac{}{8}$? $\frac{2}{3} - \frac{1}{7} = \frac{}{21}$?

This drawing represents the roof and walls of a house.   The triangular part, *ABC*, is called the "gable."   The line *BD* represents the height of the gable.

To find the area of the gables you must find the area of how many triangles ?

NOTE. — Let some pupil make a small model of a house out of thin wood. Fasten together with hinges, as indicated in the illustration.

1. Find how many square feet of boards will be needed to cover the ends of this house.   The height of the gable is 3 ft.

2. If this house is 24 ft. long, find the number of square feet of boards needed to cover the sides of the house.

3. If the rafter is 16 ft. long (the line *BC* represents the rafter), how many square feet of boards will cover the roof?

4. How many square feet of boards will be needed to cover the whole house?

5. Make drawings to represent the ends, sides, and roof of a house, 42 ft. long, 36 ft. wide, and 18 ft. posts (18 ft. from ground to eaves), the gable to be 12 ft. high, the rafter to be 20 ft. long.   Find the number of square feet of lumber needed to board and roof the house.

6. For a house 40 ft. by 30 ft., with 18 ft. posts.   The height of the gable is 10 ft., and the rafter is 21 ft. long.

7. For a house 30 ft. by 24 ft., with 20 ft. posts.   The height of the gable is 6 ft., and the rafter is 15 ft. long.

The following is the weekly time sheet and daily wages of the employees of a mill. 10 hours constitutes a day's work.

	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Wages.
Chas. Cowles . .	$9\frac{1}{2}$	8	$7\frac{1}{2}$	$10\frac{1}{2}$	10	$6\frac{1}{2}$	$1.50
J. Brown . . .	$8\frac{1}{2}$	4	10	$9\frac{1}{2}$	$8\frac{3}{4}$	6	1.70
Henry Hall . .	$4\frac{1}{4}$	$6\frac{1}{2}$	$8\frac{1}{4}$	10	$10\frac{1}{4}$	9	1.20
C. Hyde	$6\frac{3}{4}$	$7\frac{1}{2}$	$8\frac{1}{4}$	$9\frac{3}{4}$	10	$8\frac{1}{4}$	1.80
J. Smith	$7\frac{1}{2}$	$10\frac{1}{2}$	$2\frac{1}{2}$	7	6	9	2.00

1. Find how much Mr. Cowles received each day.

2. Find how much Mr. Cowles received for the week.

3. What would have been Mr. Cowles' wages for the week if he had worked full time each day?

4. Answer the same questions for each of the other men.

5. Find the total week's wages for the five men.

6. Make out a similar time sheet supplying all items.

7. If 9 hours constitute a day's work and $1.50 a day's pay, find the week's wages of the following: —

	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
A	$5\frac{1}{2}$ hr.	8 hr.	9 hr.	7 hr.	$4\frac{1}{2}$ hr.	6 hr.
B	$7\frac{3}{4}$	$9\frac{1}{2}$	$4\frac{1}{2}$	0	$7\frac{1}{2}$	$6\frac{3}{4}$
C	8	9	$8\frac{1}{2}$	6	$7\frac{1}{2}$	9
D	9	$8\frac{1}{2}$	9	$5\frac{1}{2}$	8	8
E	9	$7\frac{1}{2}$	6	9	$6\frac{1}{2}$	9

8. How much more did D receive than A?

9. How much did C lose for his absence during the week?

10. How much did A lose?

11. Find the total week's wages for the five men.

1. If ⁴⁄₇ of a barrel of oil cost $36, what will ⁵⁄₈ of a barrel cost?

2. If 80 cents are paid for ⁵⁄₈ of a basket of peaches, what is the cost of ½ of a basket?

3. I sold a horse for $48, which was ⁸⁄₉ of what he cost me. What did he cost me?

4. George sold a kite for ⅔ of what he paid for it, and lost 8 cents.

5. 8 is ⅔ of what number?

6. The difference between ⅔ and ₁⁹₀ of a number is 5. What is the number?

7. Change to fractions having smaller terms: ¹⁵₈, ¹²₁₈, ₂⁹₇, ³¹₄, ³⁹₈, ¹²₁₄, ¹⁵₈, ²⁶₄, ¹⁴₅, ⁴⁹₈, ³⁹₈, ³⁶₈.

8. If 6 yd. of muslin cost 60 cents, what will 2 yd. cost? 3 yd.? 12 yd.?

9. Carl picks berries, and sells them at 9¢ a quart. How many quarts must he sell to earn enough to buy a hat worth 70 cents, and a slate worth 11 cents?

10. How far will a man travel in 48 days, if he travels 30 miles in 4 days?

11. What is the relation of 32 to 4? Of 27 to 9?

12. Sold a cow for $24, which was ⅝ of the cost of the cow.

13. If 6 men build 10 rd. of wall in a given time, how many rods can 54 men build in the same time?

14. If ¾ of 48 oranges cost 40 cents, what will ¾ of 12 oranges cost?

15. A watch cost $30, and ⅔ of its cost is twice the cost of the chain.

16. What is the value of 3 bu. of peaches at the rate of $2 for ⅔ of a bushel?

17. A coal dealer had 50 tons of coal. He burned 30 tons; what is the remainder worth at $4 a ton?

1. What per cent did I lose by selling a buggy for $150 that cost me $180 ?

2. If some books cost me $.40 each, what per cent did I lose by selling them at $4.50 a dozen?

3. What is the worth of a pile of wood 48 ft. long, 6 ft. high and 4 ft. wide, at $4¼ a cord?

4. A rectangular flower garden is 30 yd. long and 18 yd. wide. What is its area ?

5. At $6 a cord, what is the value of 2 piles of wood 20 ft. long, 4 ft. wide, and 10 ft. high?

6. What is the area of a rectangle 20 in. long and 15 in. wide ?

7. A rectangular walk contains 225 square feet; its length is 25 feet. What is its width ?

8. What is the area of a walk 25 ft. long, and 9 ft. wide ?

9. What is 75% of 844? What is .75 of 844? What is $\frac{75}{100}$ of 844 ?

10. $125 is .25 of what sum? It is 25% of what sum ?

11. A house is 36 ft. wide and 52 ft. long, and has 18 ft. posts. The height of the gable is 9 ft., and the rafters are 21 ft. long. Find the square feet of boards needed to cover its entire surface.

12. What is the price of one ream of paper when 19 reams cost $8.55 ?

13. What is the price of 1 cord of wood when 3.75 cd. cost $18.75?

14. $18\frac{2}{3} - 2\frac{1}{15}$. $16\frac{1}{3} - 5\frac{3}{4}$. $129\frac{1}{3} - 85\frac{7}{13}$.

15. The owner of $\frac{2}{3}$ of a mill sold $\frac{1}{3}$ of the mill to one man, and $\frac{1}{4}$ to another. What part did he still own?

16. Find the cost of 125 gal. at $.37½.

17. If your father owned $\frac{1}{4}$ of a factory worth $30,000, and sold $\frac{2}{3}$ of it, what part would he then own? and what would it be worth ?

1. Find the amount of money a farmer received if he sold the following : 105 bu. turnips @ 50¢ ; 111 bu. beets @ 80¢ ; 114 bu. parsnips @ 93¢ ; 215 bu. onions @ 98¢ ; 236 bu. tomatoes @ 42¢ ; 137 doz. cabbages @ 48¢.

2. Find the money he would have paid out if he bought at a market : 27 lb. pork @ 18¢ ; 32 lb. beef @ 12¢ ; 18 lb. mutton @ 14¢ ; 12 lb. veal @ 15¢ ; 18 lb. lamb at 17 ¢ ; 25 lb. ham @ 15¢.

3. Find the value of 7 piles of wood, each 48 ft. long, 4 ft. wide, and 12 ft. high, at $3.75 a cord.

4. How many blocks, each measuring one cubic inch, will it take to fill a mortise hole 12 in. long, 4 in. wide, and 6 in. deep ?

5. How many square yards are there in the walls of a room 24 ft. long, 15 ft. wide, and 14 ft. high ?

6. How many square rods in a rectangular garden 231 ft. long by 165 ft. wide ?

7. Find the cost of 9,600 sheets of paper at $4.20 a ream.

8. How many half-pint bottles can be filled from a ten-gallon can of milk ?

9. A man bought a house and lot for $6,835. He repaired the house at a cost of $1,250. The house was burned, and he received $3,575 insurance. He then sold the lot for $4,516. Did he gain or lose ? and how much ?

10. How long will 150 lb. butter last a family if they use 3½ lb. a week ?

11. Cash on hand at the beginning of the day, $685.25. Received for cash sales during the day, $316.87. Paid out during the day, $137.95. What is the cash balance at the end of the day ?

12. Find the area of a rectangle 5.8 ft. long by 4.6 ft. wide.

13. Compare a 3-in. line with a 6-in. line. A 3-in. square with a 6-in. square. A 3-in. cube with a 6-in. cube.

1. What per cent is gained by selling a plough for $10 which cost $8 ?

2. 20% of a number is 40. What is the number?

3. 60 lb. is 6% of how many pounds?

4. $24 is 8% of how many dollars? $36 is 12% of how many?

5. How many times are .3 contained in .15? .4 in .8? .6 in 1.2? .9 in 2.7?

6. How many times are .03 contained in .06? .04 in .08? .06 in .12? .09 in .27?

7. Divide .006 by .002. .018 by .003. .024 by .012. 1.44 by .12. .144 by .012.

8. If 5 men can do a piece of work in $\frac{6}{15}$ of a week, in what time can 1 man do it?

9. If 4 men can do a piece of work in $\frac{2}{3}$ of a week, in what time can 1 man do it?

10. If $\frac{2}{3}$ of a box of raisins is worth $4, what is 1 box worth? How many apples at $2 a bushel will pay for the box?

11. $8\frac{1}{2}$ is $\frac{4}{5}$ of what number?

12. Give answers:

$$\frac{1}{3} - \frac{1}{4} \qquad \frac{3}{4} - \frac{1}{4} \qquad \frac{3}{4} - \frac{2}{3} \qquad \frac{1}{4} - \frac{1}{5} \qquad \frac{1}{3} - \frac{1}{4}$$

$$\frac{2}{3} - \frac{1}{3} \qquad \frac{1}{7} - \frac{1}{8} \qquad \frac{4}{7} - \frac{1}{3} \qquad \frac{1}{3} - \frac{1}{5} \qquad \frac{5}{8} - \frac{1}{3}$$

How many cubic inches in a rectangular solid:

13. 6 in. long, 5 in. wide, and 3 in. thick?

14. In a solid 4 in. long, 2 in. wide, and 7 in. thick?

15. In a solid 12 in. long, 12 in. wide, 12 in. thick?

16. In a cube 3 in. long, 3 in. wide, and 3 in. thick?

17. At what price must books that cost $4 each be sold so as to gain 50%? 25%? 10%?

18. George has 15 cents, which is 5% of what William has. How many cents has William?

19. What is 4% of 300? 500? 1000?

1. Mrs. John Bell bought of Chas. Brown & Co., on Aug. 20, the following: — 35 yd. silk @ $1.35; 5 yd. lining @ $.13; 3½ yd. lining @ 22¢; 6 yd. muslin @ 9¢; 8 doz. buttons @ 32¢; 11 yd. cotton @ 11¢; 7 yd. flannel @ 36¢; 1 pair kid gloves @ $1.50; 6½ yd. ribbon @ 38 ; 2 silk handkerchiefs @ $1.12½; 8½ yd. embroidery @ 25¢.   Make out an itemized bill.

2. Most business houses render a monthly statement.

The following is the form of the above account to be rendered every month after the first one.

<div style="text-align:right">New Haven, Oct. 1, 1902.</div>

MRS. JOHN BELL,

<div style="text-align:center">To CHAS. BROWN & CO., Dr.</div>

| | | To acct. rendered, | | *$62* | *25* || |

3. Sometimes after bills have been rendered, part of the money is paid, and other articles purchased.   This demands a little different form.   Suppose that Mrs. Bell, on Oct. 10, should buy 12 yd. of cloth @ $1.75, and 5 yd. @ $1.50 and that on Oct. 15 she should pay $40.50.   The following statement and bill would be sent on Nov. 1:

<div style="text-align:right">New Haven, Nov. 1, 1902.</div>

MRS. JOHN BELL,

<div style="text-align:center">To CHAS. BROWN & CO., Dr.</div>

							$62	*25*
		To acct. rendered,					
Oct.	*10*	To 12 yd. cloth @ $1.75,	*$21*	*00*			
"	*10*	" 5 yd. cloth @ $1.50,	*7*	*50*		*28*	*50*
		Credit,				*$90*	*75*
Oct.	*15*	By cash,				*40*	*50*
		To balance,				*$50*	*25*

4. As clerk for Chas. Brown write a letter to Mrs. Bell inclosing a statement for Dec. 1, 1902, and asking for immediate payment.

5. As Mrs. Bell write an answer, inclosing a payment of $25.

1. Transactions: Dec. 3, 1902, Frank Keith bought of the Holyoke Lumber Co. 1,350 ft. pine lumber @ $32.50 per M.; 4,750 ft. spruce @ $26.75 per M.; 4,125 cedar @ $8.75 per C. On Dec. 21 he bought 6,500 shingles @ $4.75 per M.; 16,450 pickets @ $7.70 per M. On Jan. 5 he paid $150. On Jan. 15 he paid $145. Feb. 10, he paid the balance in full.

a. Render an itemized bill Jan. 1, 1903.

b. Render a credit statement of his account on Jan. 5, 1903.

c. Render another statement when he makes his next payment, Jan. 15.

d. Render a monthly statement for Feb. 1, 1903.

e. Make a statement and receipt it in full on Feb. 10.

2. Find the number of square feet of boards needed to board and roof a house 40 ft. long, 20 ft. wide, with 15 ft. posts. The gable is 5 ft. high and the rafters are 14 ft. long.

3. A man deposited in the bank $1,840, and drew out by check the following sums: $35.48, $143.18, $216.09, $5.49, $43.69, $78.23, $25. How much has he left in the bank?

4. Express in words, .054; .0006; 4.0002; 3.001.

5. At $6.50 a hundred, how many pounds of beef cost $45.50?

6. Find the value of 645 lb. of hay at $18 a ton.

7. At 35¢ a peck, how many bushels of potatoes can be bought for $119.00?

8. Multiply:

749 by 123	645 by 456½	1543 by 901
706 by 987	654 by 609¹	3809 by 786
879 by 234½	798 by 807¼	2689 by 504

9. Divide:

866987 by 269	619115 by 665	352204 by 764
136160 by 368	359871 by 863	253006 by 962

These lines represent streets in a city. Each square represents a block. *S* represents the position of the schoolhouse. The other letters represent the homes of different pupils. Scale ¼ inch for 40 rods.

1. Find how many rods A must travel to go to school. What part of a mile?

2. How many rods would B travel? What part of a mile?

3. Answer the same questions for C, D, E, F, G, H.

4. How far would A travel if he called for E?

5. How far would B travel if he called for D?

6. How far would C travel if he called for G?

7. How far would D travel if he called for B?

8. How far would E travel if he called for H?

9. How far would F travel if he called for G?

10. How far would G travel if he called for B?

11. How far would H travel if he called for D?

12. If it takes 16 min. to walk a mile, how long will it take each pupil to go direct to school?

13. How long, when they call for their friends, as indicated in questions 4 to 12?

14. If A can ride his bicycle a mile in 10 min., how long will it take him to take this trip: From his house past H, C, E, G, and the schoolhouse to his home?

15. Riding at the same speed, how long will it take F, starting from his home, to go past the homes of G, B, D, E, H, and A to his home?

16. At the same rate, how long will it take G, starting from his home, to go to D's home on an errand, back home, and then to school?

17. How long will it take D to make the circuit of the square?

1. A man sold a horse for $233.05 and gained $35.55.

2. A dealer bought 50 buffalo robes at $8 each, and sold them at 16% loss.

3. A man bought 25,460 lb. of cotton at 8¢ a pound. A fire destroyed ¼ of it. He sold the rest of it at 11¢ a pound.

4. A farmer raised 1,860 bu. of potatoes. He sold 60% of them at 65¢ a bushel, and the remainder at 85¢ a bushel.

5. Bought cloth for $58⅔, and sold it for $49¾.

6. Cloth costing $16.85 is sold at a loss of 8%.

7. Hay costing $16.85 is sold at a loss of 15%.

8. 7.2 acres of land yielded 576 bu. of corn.

9. A man bought 7360 lb. of coal at $6.25 a ton.

10. A man bought 8 horses at $135 each and 6 at $130.50.

11. I paid $6.75 for coffee at 25¢ a pound.

12. 10 years ago the population of a certain city was 60,000. Since then it has increased 40%.

13. My neighbor owns 50 square rods of land worth $345. I own one acre.

14. A man paid $184 for apples at $1⅔ a barrel.

15. A farmer gave 6 doz. eggs, worth 16¢ a dozen, for 30 lb. of sugar at 4¢ a pound.

16. The sum of two numbers is 27, and the greater number is 19.

17. Hay is worth to-day $18 a ton. This is 50 % higher than it was three months ago.

18. $245 is 40% more money than I own.

19. A floor is 14 ft. by 17 ft.

20. A commission merchant sold 80 tons of hay at $17.50 a ton. His commission was 3 %.

21. A real estate dealer bought 5½ acres of land and cut it up into 16 house lots.

22. The premium for insuring a house at 2% was $40.
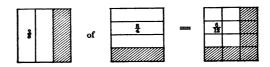
1. Mr. John Morris bought of Chas. Scott & Co., on Aug. 27, 1902, 25 lb. sugar @ 7¢; 11 lb. tea @ 45¢; 12 lb. coffee @ 36¢; 22 lb. raisins @ 12¢; 19 lb. currants @ 9¢; 17 lb. crackers @ 9¢. Make out a bill, and receipt it as clerk.

2. Divide 766,080 by 315.　701,153 by 211.

3. Multiply 3,548 by 368.　6,497 by 309.

4. A farmer has 7 lots, in each of which he pastures 9 cows. Each cow gives 12 qt. of milk a day. If he sells the milk at 6¢ a quart, how much does he receive in a week?

5. If 16 bu. of potatoes cost $10, how many bushels can be bought for $25?

6. If 8 lb. of wool are obtained from one sheep in a year, how much money will a man receive from a flock of 48 sheep, if wool is $33\frac{1}{3}$¢ a pound?

7. What will it cost to paint the walls and ceiling of a room 36 ft. by 27 ft., and 12 ft. high, at $1.20 a square yard?

8. A farmer sold to a grocer 26 bu. of apples, at $1.25 a bushel, and took his pay in flour at $3.25 a barrel. How many barrels did he receive?

9. A farmer sold 2 loads of hay, one for $15¾, and the other for $18⅓. If he received $28 in cash, how much is still due?

10. If 9½ tons of hay cost $95, how many tons can be bought for $108?

11. What is the value of three piles of wood, each 360 ft. long, 4 ft. wide, 6 ft. high, at $3.40 a cord?

12. Find the value of a piece of land 33 ft. by 40 rd., at $800 an acre.

13. A man bought a number of cows for $1,920. He sold them for $2,400. How much did he gain? If he gained $10 on each cow, how many cows were there?

14. Divide 8,763½ by 11.

15. If 56 men can do a piece of work in 21 days, how long will it take 24 men to do it?

1. What part is gained by buying a horse for $400, and selling it for $500? What per cent is gained?

2. For what sum would the horse be sold to lose 25%?

3. At 33⅓¢ a square foot, what will a square yard of anything cost?

4. What part does a merchant make by selling his goods for ⅝ of their cost? What per cent does he make?

5. Two boys do a piece of work for $6. If each boy does the same amount of work, how ought the money to be divided?

6. What is the interest of $200 for 2 years?

7. A merchant sold for $200 goods that cost him $160. What per cent did he gain?

8. Find the cost of 7 doz. pencils at $4.80 a gross.

9. How far can a ship sail in ⅝ of a day at the rate of 6 miles an hour?

10. What part of a 4-foot square is a 2-foot square?

11. Find the cost of 15 oranges if 5 oranges cost 12 cents?

12. Of what number is 16 8%?

13. Of what number is 21 33½%?

14. If you miss 8 words out of 24, what per cent do you spell correctly?

15. What per cent of profit do I make when I buy for $4, and sell for $6?

16. Find the gain when coal costing $4.50 a ton is sold at a gain of 10%. From the cost and gain, what can you find?

17. If the cost of ⅔ of a yard of silk is 60 cents, what is the cost of a yard?

18. How many cents in ⅝ of a dollar?

19. When muslin costs 8¢ a yard, what part of a yard can be bought for 2 cents? 4 cents? 6 cents?

20. How many days will 21 lb. of butter last, if ½ lb. is used each day? How many weeks?

1. Mary had ½ of a yard of cloth, and used ⅔ of it. How much of a yard did she use?

The line represents 1 yard. The broad part represents the ½ that Mary had. She used ⅓ of this. Her part is divided into thirds, and the third that she used is indicated. If we divide the whole yard into pieces of the same size we shall have 6 of them; so that the part she used is ⅙ of the whole yard.

2. Mary had ⅔ of a yard, and used ¾ of it. How much of a yard did she use?

3. Multiply ⅔ by ¾.

⅓ of ¾ = ¼

⅔ = 2 × ¼ = 2/4 = ½

This means find ⅔ of ¾. We first find ⅓ of ¾, which is ¼. ⅔ will be 2 × ¼, which are 2/4 or ½.

$$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{6}{12} = \frac{1}{2}$$

We get the same result by multiplying the numerators and the denominators together.

4. Learn: Multiply the numerators together for a new numerator and the denominators for a new denominator, and reduce the resulting fraction to its lowest terms.

5. Multiply 8⅔ by 5¼. Multiply as in whole numbers, without changing the mixed numbers.

8⅔
5¼
―――
2⅙
4
40
―――
46⅙

First ¼ × ⅔ = ⅙. Next ¼ × 8 = 8/4 = 2. Next 5 × ⅔ = 20/5 = 4. And last, 5 × 8 = 40. Add the partial products. Do this work mentally, setting down only results.

6. Multiply: ⅔ by ⅘   ⅚ by 18/30   ⅘ by 13/24

                ⅘ by ⅝   ⅞ by 5/12   8/15 by 15/16

7. Multiply: 5¾ by 4½   4⅔ by 3½   16¼ by 4⅘

                5⅓ by 6½   6⅔ by 3⅓   21⅔ by 6⁴⁄₇

Find the cost of :

1. 424½ lb. starch @ 9¾¢.
2. 88¾ bu. wheat @ 88⅝¢.
3. 48⅝ tons of coal @ $6¼.
4. 24½ gal. oil @ 12½¢.
5. 64½ bbl. flour @ $6¾.
6. 15⅜ lb. coffee @ 35¾¢.
7. 3⁴⁄₇ bu. apples @ $⅝.
8. 16¾ tons of hay @ $16¼.
9. 15⅞ bbl. of flour @ $6¾.
10. 8¾ yd. clòth @ $2¼.
11. 25⅜ cd. wood @ $3¾.
12. 52½ bu. wheat @ 62½¢.
13. If ⅜ of A's farm cost $2,480, what did the whole farm cost?
14. If ⁴⁄₉ of a yard of cloth cost $2.10, what will 9 yd. cost?
15. If ⅝ of a hundred-weight of sugar cost $12.45, what will be the cost of 20 hundred-weight?
16. $46⅞ is ₁⁵₈ of what I paid for 1 horse. At the same rate, what would I have paid for 4 pairs of horses?
17. Find the area of the top of a table 8½ ft. by 4½ ft.
18. Find the area of a blackboard 32¼ by 4½ ft.
19. Find the area of an oilcloth 4½ by 16¾ ft.
20. Find the area of a rectangular field 36¼ rd. by 40¾ rd.
21. Find the area of a rectangular field 75¾ rd. by 32¾ rd.
22. Find the area of a rectangular field 80⅝ rd. by 36⅞ rd.
23. Find the area of a rectangular field 70₁⁴₃ rd. by 96₁³₀ rd.
24. Find the area of a rectangular field 48¾ rd. by 50⅝ rd.
25. A man bought 400 bu. of potatoes at 45¢ a bushel. For how much must he sell them a bushel to gain $8.00?
26. A man bought 168 sheep at $5½ a head. He sold ⅝ of them at $6 a head, and the remainder at $7 a head. Find gain.
27. Find the number of cubic inches in a stick of timber 8 ft. long, and 1 foot square at the end.

Find the cubic feet in the following:

1. A box 2 ft. by 3 ft. by 3 ft.
2. A box 3 ft. by 2 ft. by 6 ft.
3. A box 2 ft. by 2 ft. by 2 ft.
4. A box 2 ft. by 2 ft. by 3 ft.
5. A box 5 ft. by 2 ft. by 3 ft.
6. A box 4½ ft. by 2 ft. by 3 ft.
7. A box 3½ ft. by 2 ft. by 2 ft.
8. A box 2½ ft. by 2 ft. by 3 ft.
9. A box 3 ft. by 3 ft. by 3 ft.
10. A box 5 ft. by 4 ft. by 6 ft.

Perform the following in 2 ways:

11. If you had 8 apples, and gave me ¼ of ½ of them, how many would you give me?
12. Give me ½ of ¼ of 8 apples.
13. Give me ⅓ of ¾ of 8 apples.
14. Give me ⅛ of ¾ of 8 apples.
15. Give me ¼ of ⅝ of 8 apples.
16. Give me ½ of ⅝ of 8 apples.
17. Give me ⅔ of ¾ of 8 apples.

Suppose you have 15 apples,

18. Give me ⅓ of ⅕ of them.　　19. Give me ⅔ of ⅔ of them.
20. Give me ⅔ of ⅗ of them.　　21. Give me ⅓ of ⅔ of them.
22. Give me ⅔ of ⅗ of them.　　23. Give me ⅔ of ⅗ of them.

24. A horse cost \$90 and a sleigh ⅔ as much. Find the cost of both.

25. A man bought a hat for \$3.50 and a tie for 75 cents. How much change should he receive from a \$5 bill?

26. \$1, less the cost of 3 pk. of peas at 20¢ a peck, equals what?

27. If \$63 was paid for 9 yd. of cloth, what was the cost of 7 yd.?

$\frac{2}{3} = \frac{8}{12}$

$\frac{3}{4} = \frac{9}{12}$

$\frac{8}{12} \div \frac{9}{12} = 8 \div 9 = \frac{8}{9}$

1. Divide $\frac{2}{3}$ by $\frac{3}{4}$.
2. Divide $\frac{9}{10}$ by $\frac{3}{4}$. $\frac{3}{14}$ by $\frac{7}{8}$.
3. Divide $\frac{5}{8}$ by $\frac{5}{6}$. $\frac{5}{8}$ by $\frac{7}{12}$.
4. Divide $\frac{4}{13}$ by $\frac{3}{4}$. $\frac{7}{14}$ by $\frac{8}{9}$.

5. Learn: Change the fractions to a common denominator, and divide the numerator of the dividend by the numerator of the divisor.

6. Divide :

a	b	c	d
$\frac{3}{8}$ by $\frac{3}{4}$	$\frac{3}{4}$ by $\frac{2}{3}$	$\frac{5}{8}$ by $\frac{1}{4}$	$\frac{7}{9}$ by $\frac{3}{14}$
$\frac{3}{4}$ by $\frac{7}{8}$	$\frac{5}{8}$ by $\frac{3}{4}$	$\frac{9}{10}$ by $\frac{2}{3}$	$\frac{7}{12}$ by $\frac{5}{8}$

7. Divide :

a	b	c	d
$\frac{3}{16}$ by $\frac{1}{8}$	$\frac{7}{8}$ by $\frac{2}{3}$	$1\frac{2}{3}$ by $\frac{4}{7}$	$\frac{7}{9}$ by $\frac{3}{8}$
$\frac{3}{4}$ by $\frac{1}{3}$	$\frac{7}{8}$ by $\frac{1}{4}$	$\frac{5}{8}$ by $\frac{1}{4}$	$\frac{9}{10}$ by $\frac{3}{4}$

8. Divide :

a	b	c	d
$\frac{5}{8}$ by $\frac{2}{3}$	$\frac{9}{12}$ by $\frac{3}{8}$	$\frac{1}{4}$ by $\frac{2}{3}$	$\frac{7}{8}$ by $\frac{4}{7}$
$\frac{2}{3}$ by $\frac{9}{10}$	$3\frac{5}{8}$ by $1\frac{3}{8}$	$1\frac{3}{8}$ by $\frac{7}{9}$	$1\frac{1}{2}$ by $4\frac{5}{8}$

9. Divide :

a	b	c	d
$1\frac{5}{8}$ by $\frac{3}{8}$	$4\frac{1}{2}$ by $\frac{7}{11}$	$\frac{1}{4}$ by $\frac{3}{8}$	$\frac{4}{9}$ by $\frac{5}{8}$
$\frac{8}{15}$ by $\frac{1}{7}$	$\frac{9}{16}$ by $\frac{3}{4}$	$\frac{8}{15}$ by $\frac{3}{20}$	$\frac{3}{20}$ by $\frac{8}{15}$

10. Divide :

a	b	c	d
$1\frac{4}{5}$ by $\frac{5}{8}$	$1\frac{3}{8}$ by $\frac{9}{11}$	$\frac{3}{4}$ by $\frac{9}{16}$	$\frac{4}{11}$ by $\frac{3}{8}$
$1\frac{9}{7}$ by $\frac{5}{8}$	$2\frac{3}{8}$ by $4\frac{5}{9}$	$\frac{4}{7}$ by $\frac{3}{8}$	$1\frac{4}{7}$ by $\frac{5}{8}$

NOTE. — Mixed numbers should first be changed to improper fractions.

11. Divide:

a	b	c	d
$4\frac{3}{8}$ by $6\frac{9}{10}$	$84\frac{3}{8}$ by $4\frac{1}{2}$	$28\frac{3}{8}$ by $4\frac{1}{2}$	$4\frac{3}{8}$ by $1\frac{3}{8}$
$8\frac{5}{8}$ by $12\frac{3}{8}$	$45\frac{5}{8}$ by $12\frac{1}{2}$	$16\frac{3}{4}$ by $12\frac{1}{2}$	$3\frac{5}{8}$ by $6\frac{1}{4}$

12. Divide :

a	b	c ·	d
$14\frac{3}{8}$ by $17\frac{1}{2}$	$9\frac{3}{14}$ by $32\frac{4}{7}$	$24\frac{1}{2}$ by $2\frac{1}{3}$	$9\frac{3}{8}$ by $5\frac{4}{8}$
$5\frac{3}{8}$ by $7\frac{7}{8}$	$2\frac{1}{3}$ by $5\frac{1}{4}$	$6\frac{2}{3}$ by $4\frac{1}{2}$	$18\frac{4}{7}$ by $\frac{2}{3}$

1. Change to lowest terms: —

$\frac{18}{16}$, $\frac{21}{14}$, $\frac{64}{24}$, $\frac{75}{44}$, • $\frac{34}{44}$, $\frac{75}{125}$, $\frac{198}{188}$, $\frac{138}{408}$.

2. Change to higher terms: —

   a. $\frac{1}{2}$, $\frac{5}{6}$, $\frac{3}{8}$, $\frac{5}{12}$ to 24ths.

   b. $\frac{2}{3}$, $\frac{1}{4}$, $\frac{5}{6}$, $\frac{7}{9}$, $\frac{7}{12}$ to 36ths.

3. Change to similar fractions, or to fractions having the same denominator: — ·

   $\frac{3}{16}$, $\frac{1}{4}$, $\frac{7}{8}$. $\frac{5}{8}$, $\frac{11}{16}$, $\frac{4}{36}$. $\frac{2}{3}$, $\frac{9}{10}$, $\frac{7}{15}$.

   $\frac{3}{4}$, $\frac{5}{8}$, $\frac{1}{6}$. $\frac{7}{9}$, $\frac{3}{14}$, $\frac{5}{21}$. $\frac{7}{12}$, $\frac{3}{8}$, $\frac{9}{24}$.

4. Change to improper fractions: —

   $6\frac{3}{4}$, $9\frac{1}{2}$, $4\frac{5}{8}$, $9\frac{3}{7}$, $12\frac{5}{8}$, $15\frac{5}{7}$, $91\frac{7}{10}$, $21\frac{5}{11}$, $74\frac{9}{14}$.

5. Change to mixed numbers: —

   $\frac{175}{12}$, $\frac{235}{24}$, $\frac{177}{24}$, $\frac{376}{25}$, $\frac{82}{9}$, $\frac{91}{4}$, $\frac{46}{7}$, $\frac{81}{16}$, $\frac{85}{12}$.

6. Add: — $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{8}$. $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{12}$. $\frac{3}{8}$, $\frac{7}{10}$, $\frac{9}{20}$.

       $12\frac{1}{2}$, $9\frac{1}{4}$, $8\frac{5}{8}$. $7\frac{1}{2}$, $8\frac{3}{4}$, $7\frac{3}{4}$. $9\frac{1}{4}$, $6\frac{1}{8}$, $7\frac{3}{4}$.

7. Subtract: — $\frac{2}{3} - \frac{1}{4}$. $\frac{5}{8} - \frac{2}{3}$. $\frac{4}{5} - \frac{3}{4}$.

         $16\frac{1}{4} - 12\frac{1}{3}$. $17\frac{1}{8} - 9\frac{1}{2}$. $8\frac{5}{8} - 4\frac{3}{4}$.

8. Multiply: —

   $\frac{2}{3}$ by 6. $\frac{3}{4}$ by 8. $\frac{1}{8}$ by 16. $6\frac{1}{3}$ by 9.

 · 21 by $\frac{2}{3}$.   24 by $\frac{5}{6}$. $4\frac{3}{4}$ by 6.   84 by $\frac{2}{7}$.

   $3\frac{1}{3}$ by $\frac{3}{4}$. $\frac{9}{7}$ by $\frac{3}{8}$. $5\frac{2}{3}$ by $4\frac{1}{2}$. $8\frac{2}{3}$ by $6\frac{1}{4}$.

9. Divide: —

   $18\frac{2}{3}$ by 6. $14\frac{1}{3}$ by 4. $11\frac{2}{3}$ by 7. $32\frac{1}{4}$ by 4.

   18 by $\frac{2}{3}$.   36 by $\frac{3}{4}$.   21 by $\frac{3}{7}$.   16 by $6\frac{2}{3}$.

   $\frac{9}{7}$ by $\frac{3}{4}$. $\frac{3}{4}$ by $\frac{2}{3}$. $\frac{5}{8}$ by $\frac{3}{4}$. $2\frac{1}{2}$ by $\frac{5}{8}$.

10. If it takes $\frac{5}{8}$ of a yard of cloth for a child's apron, how many aprons can be made from $16\frac{2}{3}$ yd.?

11. A man sold $9\frac{1}{2}$ acres of land at \$$62\frac{1}{2}$ an acre. How much did he receive for the land?

12. If $5\frac{1}{2}$ tons of coal are worth \$$35\frac{3}{4}$, how much is one ton worth?

13. $6\frac{2}{3} + 4\frac{3}{4} + 7\frac{1}{2} = ?$ $6\frac{5}{8} + 4\frac{2}{3} - 5\frac{5}{6} = ?$ $7\frac{1}{2} - 3\frac{2}{3} = ?$

1. What is 25% of $50?

2. What is 75% of $200?

3. If 8 bbl. of flour cost $40, what will 5 bbl. cost?

4. If 10 bbl. of flour cost $60, what will 12 bbl. cost?

5. If 12 men can build 48 rods of wall in a day, how many rods can 20 men build in the same time?

6. If 7 acres of land are worth $50, what will 14 acres cost?

7. If 56 is divided by 7, the quotient multiplied by 8, the product diminished by 14, the remainder divided by 5, the quotient increased by 12, the sum diminished by 7, the remainder multiplied by 4, what is the result?

8. The area of a rectangular grass plot is 108 square yards. If its breadth is 9 ft., what is its length?

9. The contents of a box is 24 cubic inches. If it is 4 in. long, 3 in. wide, how high is it?

10. A man bought a cow. He paid $30 down, and agreed to pay the balance in two installments of $14 each. What was the price of the cow?

11. A boy paid 75 cents for a knife, and sold it at a loss of $33\frac{1}{3}$%. How much did he lose?

12. If I collect a bill of $300, and keep $16\frac{2}{3}$% for my work, how much do I keep? What is the money that an agent keeps called?

13. A grocer paid $30 on a bill of goods. If this is 25% of the whole bill, what is the bill?

14. A man paid $200 for a carriage, and sold it at a loss of 25%. For what did he sell it?

15. A man bought a suit of clothes, and paid $15, which was $\frac{1}{2}$ the price. The next day he paid $\frac{1}{3}$ of it. How much has he paid? How much does he still owe?

16. How much rent do I pay in a year if $\frac{1}{4}$ of a month's rent is $5?

1. The base of a triangular lot is 244 ft., and the altitude 108 ft. What is the area?

2. The diameter of a circle is 14 in. Find its area.

3. How many tubs of butter, at $16.50 each, can be bought for $206.25?

4. What is the surface of a right prism whose length is 20 in., and base a 6-in. square?

5. Out of a cask of sirup containing 96 gal., 32 gal. were drawn. What per cent was drawn?

6. What is 18% of $756.13?

7. A rectangular field is 40.4 rd. long and 30.5 rd. wide. What will it cost to build a wall round it at $1 a rod?

8. At $4.75 a cord, find the cost of a pile of wood 10 ft. long, 8 ft. high, and 4 ft. wide.

9. In New York, Mr. A. J. Palmer bought of John Fox & Co., 35 lb. crushed sugar @ 16¢; 25 lb. brown sugar @ 5¢; 12 lb. cheese @ 16¢; 18 lb. butter @ 23¢; 6 lb. raisins @ 13¢; 2 lb. crackers @ 8¢. Make out a bill.

10. A house is 28 ft. wide and 35 ft. long, and has 15-ft. posts. The gable is 7 ft. high and the rafters are 17 ft. long. How many square feet of lumber are needed to roof and board it?

11. If a barrel of flour is worth $5.60, how much will $\frac{3}{8}$ of a barrel cost?

12. What is the cost of 82.48 tons of coal at $6.25 a ton?

13. If 5 cords of wood cost $22.50, what will 3 cords cost?

14. If an acre of land costs $75, what will $17\frac{3}{4}$ acres cost?

15. A man deposited in a bank $11,467 Monday, and drew out by check $4,163; on Tuesday he deposited $2,560, and drew out $4,179; on Wednesday he deposited $12,425, and drew out $7,563. Find the balance in the bank on Wednesday night.

Let 1, 2, 3, 4, 5, 6, 7, 8, 9, represent flower-beds. Let 10 represent a lawn.

1. Find the area of each, when ¼ in. represents 10 ft. Call the diameter of the circular flower-bed 21 ft.

2. The following represents the report of books taken from a library for five days. Find the totals.

	MON.	TUES.	WED.	THURS.	FRI.	SAT.	TOTAL.
FICTION,	762	856	933	569	975	1084	
HISTORY,	321	421	203	122	324	385	
BIOGRAPHY,	217	119	314	213	125	175	
SCIENCE,	421	324	386	216	314	564	
POETRY,	313	217	401	79	126	317	
RELIGION,	98	102	104	37	203	197	
TOTAL,							

3. A table with two leaves is 50 inches wide when the leaves are up and 22 in. wide when the leaves are down. How wide is each leaf.

4. Mr. Smith and Mr. Brown live respectively 987 miles and 239 miles west of the center of the same city. How far apart do they live?

5. Mr. Jones lives 987 miles west of the center of a certain city, and Mr. Jackson lives 239 miles east of the same point. How far apart do they live?

6. Find the cost of building 904 miles of railway at $26,342 a mile.

7. Find the cost of 2,631 bu. of wheat at $.82½ a bushel.

1. Fred paid 12 cents for a knife, and sold it for 9 cents. What per cent did he lose? What is given? What is asked for?

2. George had 8 apples, and gave 50% of them to Mary. What is given and what required in this example?

3. Thomas has 6 cents, which is 50% of what his brother William has. How many has William? What is given and what required in this example?

4. Jennie had 15 cents when she went to the store, and 10 cents when she returned. What per cent of her money did she leave at the store? What is given and what required in this example?

5. B has $36, and pays 33½% of it for a coat. What does the coat cost him?

6. I buy goods for $10, and sell them for $15. What per cent do I gain?

7. A farmer had 16 bu. of corn, and sold 25% of it. How many bushels did he sell?

8. A man gave his son $12, which was equal to 25% of what he gave his daughter.

9. A man buys goods for $40, and sells them for $60. What is his gain per cent?

10. A lady had $66, and gave 33½% of it to Missions. How much did she give?

11. I buy a ball for 12 cents, and sell it for 14 cents. What per cent do I make?

12. I bought goods for $24, and sold them for $26. What per cent did I make?

13. A merchant bought a hat for $5, and sold it for $6. What per cent did he gain?

14. If I buy tea at 80 cents a pound, and sell it at $1.20 a pound, what per cent do I make?
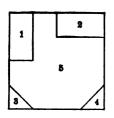
1. Make out a bill, using the following items : 467 bbl. flour @ $5.75 ; 387 bu. corn @ 72¢ ; 49 bbl. oil @ $9.72 ; 56 bbl. beef @ $17.50.   Credit by cash, $2,250.

2. Multiply 6,845 by .25 ; by .7 ; by .725.

3. Divide 23.04 by 3 ; by 6 ; by 30.

4. Divide 7.14 by .02 ; by .3 ; by .07.

5. How many sheep at $15 each will pay for 60 cows at $43.50 each ?

Add by columns and lines :

6.	*a.*	*b.*	*c.*	*d.*		**7.**	*a.*	*b.*	*c.*	*d.*	*e.*
e.	$\frac{2}{4}$ +	$\frac{3}{4}$ +	$\frac{1}{2}$ +	$\frac{3}{8}$		*f.*	$\frac{1}{4}$ +	$\frac{1}{3}$ +	$\frac{1}{2}$ +	$\frac{5}{8}$ +	$\frac{5}{12}$
f.	$\frac{1}{3}$ +	$\frac{3}{4}$ +	$\frac{5}{8}$ +	$\frac{1}{2}$		*g.*	$\frac{3}{4}$ +	$\frac{3}{4}$ +	$\frac{1}{5}$ +	$\frac{1}{2}$ +	$\frac{2}{3}$
g.	$\frac{1}{2}$ +	$\frac{1}{3}$ +	$\frac{3}{4}$ +	$\frac{5}{6}$		*h.*	$\frac{5}{12}$ +	$\frac{1}{2}$ +	$\frac{3}{4}$ +	$\frac{3}{8}$ +	$\frac{3}{4}$
h.	$\frac{5}{8}$ +	$\frac{2}{3}$ +	$\frac{1}{3}$ +	$\frac{1}{2}$		*i.*	$\frac{3}{8}$ +	$\frac{3}{12}$ +	$\frac{4}{5}$ +	$\frac{3}{4}$ +	$\frac{1}{8}$
i.	$\frac{1}{4}$ +	$\frac{1}{2}$ +	$\frac{5}{12}$ +	$\frac{2}{3}$		*j.*	$\frac{5}{8}$ +	$\frac{3}{8}$ +	$\frac{3}{4}$ +	$\frac{3}{12}$ +	$\frac{1}{4}$
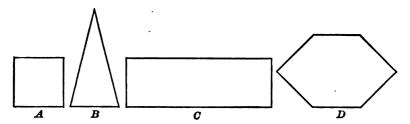
8. *a.* $46\frac{1}{2} - 4\frac{9}{11}$.   *b.* $96\frac{2}{3} - 45\frac{3}{4}$.   *c.* $200\frac{3}{8} - 90\frac{11}{12}$.
   d. $78\frac{3}{8} - 21\frac{5}{9}$.   *e.* $42\frac{4}{15} - 16\frac{3}{4}$.   *f.* $173\frac{11}{12} - 72\frac{3}{8}$.

9. How many feet of barbed wire will be required to go round a field $194\frac{5}{12}$ ft. long and $84\frac{1}{4}$ ft. wide ?

10. A man bought some wheat for $42\frac{3}{4}$, and some corn for $27\frac{3}{4}$.   If he paid $51\frac{1}{2}$, how much does he still owe ?

11. How many feet round a field that is $42\frac{1}{4}$ rd. long, and $36\frac{3}{4}$ rd. wide ?   How many yards is it ?

12. If barbed wire costs 2¢ a foot, what will it cost to put 5 wires round the above field ?

13. A man left a fortune of $96,420.   His wife received $\frac{2}{5}$, his son $\frac{1}{4}$, and his niece the remainder.   How much did each receive ?

14. A farm is divided into 4 fields containing $19\frac{3}{4}$ A., $45\frac{5}{12}$ A., $35\frac{1}{2}$ A., and $62\frac{1}{4}$ A.   How many acres in the farm ?

15. Buy an article for $99\frac{1}{2}$, and sell it for $102\frac{1}{4}$.   Find the gain on 48 articles.

1. If the scale is ¼ in. for 5 ft., find the area of each flower-bed and of the lawn. 1, 2, 3, 4 are flower-beds. 5 is a lawn.

2. What shall I pay for 3,000 pins at 37½¢ a gross?

3. Mr. Farmer sells Mr. Grocer 25 bu. of potatoes @ 62½¢; 9 bu. onions @ $1.13; 84 lb. butter @ 33½¢; 13 doz. eggs @ 28¢. He buys of him 2½ lb. tea @ 75¢; 6 lb. coffee @ 38½¢; 37½ yd. cloth @ 12½¢; sundries, $3.72. How shall they settle?
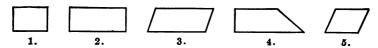
4. $12 is 30% of the cost of my watch. Should I gain or lose, and how much, if I sell it for $50?

5. A right prism of marble, 8 ft. long and 18 in. square, is bought for a monument at $3.25 a cubic foot. Find the cost of the marble. If it costs 65¢ a square foot to polish it, find the cost of polishing all but one end?

6. If ¾ of a barrel of flour is worth $4.80, what is a barrel worth?

7. I have a rectangular piece of ice that measures 2½ ft. by 1¼ ft. by 1 foot. If 1 cubic foot weighs 57 lb., find the weight of the piece.

8. Charles missed 29 words in a month. If 580 were given him, what was his per cent in spelling for the month?

9. I bought 18 tons of coal @ $5.75, and 7½ cd. of wood @ $5.50. What did the whole cost me? What would be my selling price to gain 20%?

10. A farmer sold 6 bu. 3 pk. of potatoes at 60¢ a bushel. How much did he receive for them?

11. A miller bought 350 bu. of wheat at $1.04 a bushel, and sold the flour and bran for $539. What was the gain on a bushel?

12. A dealer sold 580 bu. of potatoes at 75¢ a bushel, and wheat for 6 times as much. How much did he receive for both?

A   B   C   D
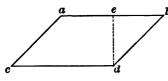
1. What form is each figure?

2. Make an estimate of the length of the perimeter of each.

3. What is the sum of the perimeters of all four figures?

4. The perimeter of *A* is what part of the perimeter of *B*?

5. The perimeter of *A* is what part and what per cent of the perimeter of *C*?

6. The perimeter of *A* is what part and what per cent of the perimeter of *D*?

7. The perimeter of *A* is what part and what per cent of the perimeters of all?

8. The perimeter of *B* is what part and what per cent of the perimeter of *C*?

9. The perimeter of *B* is what part and what per cent of the perimeter of *D*?

10. The perimeter of *B* is what part and what per cent of the perimeters of all?

11. The perimeter of *C* is what part and what per cent of the perimeters of all?

12. Using a scale of ½ inch to 20 ft., find the length of each side and of all the sides of *A*.

13. Do the same for *B*. For *C*. For *D*.

14. Using the same scale, find the area of *A* and *C*. How do they compare?

Using a scale of ½ inch for 40 rd.:

15. Find the perimeter of *A*. What part of a mile is it?

1. These figures are all quadrilaterals.

2. A quadrilateral is a plane figure having four sides.

3. A square is a quadrilateral having four equal sides and four right angles. Fig. 1.

4. A rectangle is a quadrilateral having four right angles and opposite sides equal and parallel. Fig. 2.

5. A parallelogram is a quadrilateral whose opposite sides are parallel. Fig. 3.

6. A trapezoid is a quadrilateral two of whose sides are parallel. Fig. 4.

7. A rhombus is an oblique equilateral parallelogram.
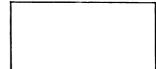
8. What is a figure like this called? Why? What line represents its base? Its altitude?

9. Cut out of paper a parallelogram whose base is 2 in. and altitude 1 in. Can you turn this parallelogram into a rectangle? Cut on the dotted line *de*. Place *ebd* so that *bd* shall coincide with *ac*. How do the base and altitude of the rectangle compare with the base and altitude of the parallelogram?

10. How then can you find the area of a parallelogram?

11. If this parallelogram is drawn to a scale of $\frac{1}{2}$ in. to 10 ft., find its area.

12. Learn: To find the area of a square, a rectangle, a parallelogram, or a rhombus, multiply the base by the altitude.

13. Find the square feet in a rectangular piece of land in the form of a parallelogram which is 120 ft. long, and has an altitude of 40 ft.

14. How many square feet are there in a parallelogram whose base is 3 ft. 4 in., and height 1 ft. 6 in.?

1. This is the plan of a garden, scale ¼ in. to 20 ft. How many yards of fencing will it take to inclose it?

2. How much will it cost at 20¢ a square foot, to make a walk 4 ft. wide all round the inside?

3. What is the circumference of a circular plot of ground 21 ft. in diameter?

4. What is the area of a room 15 ft. long, 9 ft. 6 in. wide?

5. The width of a house is 30 ft. and the height of the gable is 8 ft. What is the area of the gable?

6. A floor 15 ft. long and 12 ft. wide has a painted border all round it 3 ft. deep. How many square feet in the unpainted part? In the painted part?

7. What is the area of a triangle whose base is 20 ft., and height 10 ft. 4 in.?

8. In the Yosemite valley is the stump of a tree 35 ft. in diameter. What is its circumference? How many persons can stand on the top, if you allow 3 square feet to a person?

9. How many square feet in the surface of a four-sided pyramidal roof, whose slant height is 18 ft., and each side of its base 20 ft.?

10. How many cubic inches are there in a prism whose base is 8 in. square, and whose height is 7 in.?

11. If the radius of a circle is 14 ft., what is its circumference?

12. My wood-house is 20 ft. long, 18 ft. wide, and 10 ft. high. How many cords of wood can be piled in it?

13. A house is 36 ft. by 40 ft., with 20 ft. posts. The altitude of the gable end is 15 ft. The rafters are 24 ft. in length. The roof projects 2 ft. beyond the end of the house at both gables. Find the square feet of boards needed to cover this house.

1. Into how many 2-inch cubes can a 6-in. cube be divided?

2. Sold a watch which cost me $40 at a profit of 20%. How much did I gain?

3. By selling a barrel of flour at 25% above cost, I gained $1.50. What was the cost?

4. George has 24 marbles, which is 12% of the number he had at first. How many had he at first?

5. A boy has 3% of his marbles left. If he has 30 left, how many had he at first?

6. What per cent of $160 is $8?

7. What per cent of 28 miles is 7 miles?

8. If June 23 is Wednesday, what day of the week will July 4 be?

9. What will 48 doz. buttons cost at $1¼ a gross?

10. A rectangular board 20 ft. long contains 60 square feet. What is the width of the board?

11. How much will 44 eggs cost at 15¢ a dozen?

12. If you have 64 gills of nuts, how many pecks will you have?

13. How old must a man be to be 3 score and 6 years old?

14. A rectangular block contains 64 cu. in. It is 8 in. long and 4 in. wide; how thick is it?

15. How many quarts in 8 gal. 3 qt.?

16. How many ounces in 3 lb. 6 oz.?

17. How many seconds in 3 min.? 5 min.?

18. How many minutes in 2 hr.? In 3 hr.?

19. How many pints in 8 qt.? 10 qt.?

20. How many quarts in 32 pt.? 40 pt.?

21. How many cubic inches in 1 cubic foot?

22. How many cubic feet in 2 cubic yards?

23. When a sheet is folded in two leaves it is called a folio. How many folios will 1 quire make?

1. Add: Six thousand, seven hundred thirty-six and four thousandths; ninety-three thousand, four hundred fifty-three and three hundredths; two million, one hundred seven thousand, fifty-six and one hundred five ten-thousandths.

2. What does MMDCCLXXXVI stand for?

3. The following bushels of grain were exported from Boston in one week:

	MON.	TUES.	WED.	THURS.	FRI.	SAT.
CORN,	28,325	15,236	35,715	75,183	29,128	46,217
WHEAT,	35,719	41,719	50,108	59,275	32,546	81,126
OATS,	12,136	9,237	18,265	6,950	7,268	17,230
BARLEY,	18,230	15,738	21,375	19,263	15,928	13,637
RYE,	5,275	6,829	7,201	7,825	11,325	13,261
TOTALS,						

4. What is the total weight of 5,378 bales of cotton, which average 397 pounds a bale?

5. A drover invested $19,454 in buying 137 horses. What was the average price?

6. Divide 682,848 by 8,000. 687,198 by 53,000.

7. Add eighteen dollars and thirty-two cents; seventy-five dollars and eight cents; 419 dollars and 5 cents; 87 dollars and 30 one-hundredths; 36 dollars, 14 cents.

8. A farmer sold to a merchant 15 lb. butter @ 28¢; 25 doz. eggs @ 14¢; 5 doz. chickens @ $2.20; and in payment received 4 gal. molasses @ 55¢; 9 lb. coffee @ 28¢; 1 bbl. flour, $6.42; and the remainder in sugar at 7¢ a pound. How many pounds of sugar did he receive?

9. Reduce $\frac{4}{5}$ to 15ths. $\frac{4}{7}$ to 28ths. $\frac{5}{8}$ to 24ths.

10. Reduce to lowest terms: $\frac{8}{16}$, $\frac{32}{48}$, $\frac{14}{16}$, $\frac{32}{48}$.

11. Reduce to improper fractions:
$$5\frac{4}{8}, \quad 9\frac{4}{8}, \quad 12\frac{2}{3}, \quad 23\frac{4}{8}, \quad 38\frac{3}{4}, \quad 135\frac{4}{13}.$$

12. Find the difference between $618\frac{4}{8}$ and $327\frac{1}{4}$.

1. A drover bought 32 head of cattle for $800, and sold them all $1,120. What was the average gain on each?

2. Multiply .00036 by .0046. 21.5¾ by 175.

3. Divide 44.65 by .005. 43.2 by .0016.

4. Find the cost of the following: 5,308 lb. @ 25¢.

5. 324 gal. @ 12½¢.   **6.** 6,715 lb. @ 20¢.

7. 295 bu. @ 50¢.   **8.** 684 gal. @ 33½¢.

9. 628 gal. @ 66⅔¢.   **10.** 525 lb. @ $1.25.

11. Nov. 18, Mr. Geo. W. Hammond bought of Smith & Packard 4 lb. Java coffee @ 30¢; ½ lb. Oolong tea @ 70¢; 15 lb. granulated sugar @ 7½¢; 10 lb. A sugar @ 6½¢. Dec. 10, he bought 8 lb. rice @ 6½¢; 2 gal. sirup @ 75¢; ½ gal. molasses @ 70¢; $\frac{1}{12}$ doz. cans tomatoes, $0.50. Dec. 20 he paid $5. Jan. 5 he bought ¼ doz. cans strawberries @ 55¢ a can; 3 lb. cheese @ 5¢; 2½ lb. butter @ 40¢; 7 lb. crackers @ 6¢. Render an itemized bill Dec. 1. Render a statement and bill Jan. 1. Write a letter Feb. 10, asking for immediate payment.

12. Change 1 gal. 3 qt. 1 pt. 3 gi. to gills.

13. Change 17 T. 18 lb. to ounces.

14. Change 4,928 cu. ft. to cords.

15. How many square feet in a sidewalk 48 ft. long, and 11 ft. 4 in. wide?

16. How many square yards are there in the walls and ceiling of a room 24 ft. long, 18 ft. wide, and 12 ft. high?

17. If a rectangular field containing 4,800 sq. rd. is 40 rd. wide, what is its length?

18. How much should be paid for a pile of wood 3 ft. long, 4 ft. wide, and 5 ft. high, at $6.50 a cord?

19. A pentagonal pyramid has a base measuring 6 ft. on a side, and a slant height of 18 ft. Find its convex surface measurement.

20. A park is in the form of a triangle whose base is 40 ft. and altitude 40 ft. Find its area.

1. Given the cost of one article and the number of articles. What can you find? How?

2. Given the cost of all the articles and the number of articles. What can you find? How?

8. Given the cost of all the articles and the cost of one article. What can you find? How?

4. Given the cost and selling price. What can you find? How?

5. Given the gain and selling price. What can you find? How?

6. Given the cost and loss. What can you find? How?

7. Given the loss and selling price. What can you find? How?

8. Given the sum of two numbers and one number. What can you find? How?

9. Given the sum of several numbers and all but one of the numbers. How can you find the other number?

10. Given two numbers. What things can you find?

11. Given the product of two numbers and one number. What can you find? How?

12. Given the difference of two numbers and one number. What can you find? How?

13. Given the quotient of two numbers and the smaller number. What can you find? How?

14. Given the quotient of two numbers and the larger number. What can you find? How?

15. Given the length and breadth of a rectangle. What can you find? How?

16. Given the area and one side of a rectangle. What can you find? How?

17. Given the dimensions of a right prism. What can you find? How?

Change ⅝ to a decimal.

⅝ is an expression of division. 5 is the dividend, and 8 is the
8)5.000 divisor. This means, then, find ⅛ of 5. Since 8 is not contained
.625 in 5 units, we change 5 units to 50 tenths. 8 is contained in 50
tenths 6 tenths times, etc.

LEARN : Annex ciphers to the numerator and divide by the denominator.

1. Change to decimals :
$$\tfrac{3}{8}; \tfrac{1}{2}; \tfrac{4}{5}; \tfrac{7}{16}; \tfrac{7}{8}; \tfrac{3}{4}; \tfrac{9}{10}.$$

2. Change to decimals :
$$\tfrac{4}{5}; \tfrac{3}{12}; \tfrac{3}{8}; \tfrac{1}{4}; \tfrac{1}{8}.$$

3. Change to decimals :
$$\tfrac{5}{24}; \tfrac{12}{8}; \tfrac{5}{8}; \tfrac{5}{11}; \tfrac{5}{16}.$$

4. Change to decimals :
$$\tfrac{3}{8}; \tfrac{3}{8}; \tfrac{12}{8}; \tfrac{21}{4}; \tfrac{15}{8}.$$

5. Change to decimals :
$$\tfrac{5}{8}; \tfrac{11}{2}; \tfrac{3}{8}; \tfrac{8}{8}; \tfrac{5}{8}.$$

6. Reduce to decimals :
$$\tfrac{5}{8}; \tfrac{3}{16}; \tfrac{3}{32}; \tfrac{5}{16}; \tfrac{3}{32}; \tfrac{7}{20}; \tfrac{9}{20}.$$

7. Change to decimals :
$$1\tfrac{3}{16}; 1\tfrac{9}{16}; \tfrac{3}{40}; \tfrac{7}{80}; \tfrac{3}{40}; \tfrac{5}{80}.$$

8. Change to decimals :
$$\tfrac{12}{8}; \tfrac{11}{5}; \tfrac{13}{32}; \tfrac{5}{24}; \tfrac{5}{16}; 3\tfrac{1}{4}.$$

9. Change to decimals :
$$\tfrac{3}{64}; 1\tfrac{9}{80}; 1\tfrac{8}{16}; 18\tfrac{3}{4}; 5\tfrac{7}{16}; 9\tfrac{11}{32}.$$

10. Change to decimals :
$$4\tfrac{1}{2}; 3\tfrac{5}{8}, 76\tfrac{5}{8}; \tfrac{1}{12}; \tfrac{3}{24}; \tfrac{1}{2}; 3\tfrac{1}{2}.$$

11. Change to decimals :
$$9\tfrac{4}{5}; \tfrac{1}{32}; \tfrac{3}{25}; 13\tfrac{7}{16}; 18\tfrac{5}{16}; \tfrac{12}{13000}.$$

12. Change to decimals :
$$\tfrac{108}{1250}; \tfrac{37}{80}; \tfrac{27}{48}; \tfrac{118}{128}; \tfrac{47}{8}; \tfrac{31}{36}.$$

13. Change to decimals :
$$\tfrac{12}{48}; \tfrac{18}{200}; \tfrac{331}{800}; \tfrac{3}{25}; \tfrac{167}{800}; \tfrac{3}{180}.$$

	A	**B**		**C**	**D**
1.	25,569	46	**2.**	34,689	821
3.	94,727	37	**4.**	56,983	246
5.	39,090	75	**6.**	59,625	355
7.	46,796	92	**8.**	83,765	506
9.	57,692	15	**10.**	90,557	698
11.	48,123	24	**12.**	84,398	404
13.	57,633	76	**14.**	60,090	695
15.	47,329	33	**16.**	25,689	487
17.	69,964	84	**18.**	63,009	921
19.	87,329	97	**20.**	39,184	947
21.	59,698	89	**22.**	84,692	465
23.	54,327	32	**24.**	50,490	407
25.	48,692	67	**26.**	20,048	822
27.	37,846	57	**28.**	29,834	374
29.	89,899	39	**30.**	87,527	928
31.	72,564	74	**32.**	38,243	938
33.	64,598	47	**34.**	64,855	657
35.	79,324	66	**36.**	23,467	586
37.	68,640	82	**38.**	26,948	234
39.	89,452	55	**40.**	89,456	714
41.	29,457	69	**42.**	47,309	483
43.	38,729	48	**44.**	67,751	189
45.	47,654	37	**46.**	83,124	507
47.	83,124	43	**48.**	34,573	832
49.	37,595	72	**50.**	27,353	729

NOTE. — If pupils at this point do not need this mechanical work, omit the lesson. Fifty examples are given in multiplication, and as many in division.

What must be given to find:

1. Area of a circle? Area of a rectangle?
2. Selling price of an article? Area of a triangle?
3. Sum? Difference or remainder?
4. Product? Quotient? Per cent of gain? Gain?
5. ⅔ of 15 are ——.   15 is ⅔ of ——.
6. 12 is —— of 18.   ¾ of 12 are ——.
7. ⅗ of 15 are ——.   14 is ⅞ of ——.
8. ⅐ of 63 is ——.   6 is ⅐ of ——.
9. ⅞ of 63 are ——.   6 is ⅞ of ——.
10. ⅑ of 63 is ——.   6 is ⅑ of ——.
11. 5½ ft. are —— in.   5¼ ft. are —— in.
12. 5⅓ ft. are —— in.   5⅛ ft. are —— in.
13. 4½ ft. are —— in.   4¼ ft. are —— in.
14. 1 lb. 4 oz. of cheese at 16¢ a pound will cost —— cents.
15. When candy is 10¢ a pound, for 25 cents I can buy —— lb. and —— oz.
16. Mary has a rectangular flower-bed. It is 4 ft. long and half as wide as it is long. Find its perimeter and area.
17. Helen has a square picture-frame. It is 10½ in. from one corner to the next corner. What is the distance round the frame?
18. ⅞ of 49 are ⅞ of what number?
19. I buy a bushel of walnuts for $2, and sell them at 10¢ a quart. What is my gain?
20. Mary paid $.75 for a sled, and $3 for a pair of shoes. How much did she pay for both?
21. A man who owned a sailboat sold ₅⁄₁₆ of it to a friend. What part did he still own?
22. What will 5 yd. of cloth cost, if 12 yd. cost $48?
23. If .5 of a peck of corn cost 10 cents, what will .5 of a bushel cost?

1. Write all the numbers between 1 and 11 that cannot be divided by any other numbers except themselves and 1.

2. What is a prime number? A prime number is a number that cannot be divided by other numbers except itself and 1.

3. Write all the numbers between 1 and 11 that can be divided by other numbers besides themselves and 1.

4. What is a composite number? A composite number is a number that can be divided by other numbers besides itself and 1.

5. Why is 6 a composite number? What numbers multiplied together make 6?

6. 3 and 2 are called factors of 6. A factor is a number that exactly divides another number.

7. Write all the prime numbers from 1 to 50.

8. Write all the composite numbers from 1 to 50.

9. Can prime numbers have any factors? If not, why not?

10. Are 4 and 3 factors of 12? Are 4 and 3 prime factors of 12?

11. Are 3 and 5 prime factors of 15?

12. A number is exactly divisible:

> By 2, if its units figure is divisible by 2.
> By 3, if the sum of the digits is divisible by 3.
> By 4, if its tens and units are together divisible by 4.
> By 5, if the units figure is 5 or 0.
> By 6, if it is divisible by 2 and 3.
> By 8, if the last three figures are divisible by 8.
> By 9, if the sum of its digits is divisible by 9.

13. Find the prime factors of 210.

$$2 \,)\, 210$$
$$3 \,)\, 105$$
$$5 \,)\, 35$$
$$7$$

$2 \times 3 \times 5 \times 7$

What prime number will divide 210? Divide by 2. What is the quotient? What prime number will divide 105? Dividing by 3, what is the quotient? What prime number will divide 35? and what is the quotient? Make a list of your divisors and last quotient. These are the prime factors of 210.

14. Find the prime factors of:

42   100   200   625   1,000

1. Find the prime factors of:

60	132	450	1,320
72	175	800	1,600

2. Find the prime factors of:

8,424	8,364	1,682	7,563
4,284	7,698	2,585	2,112

3. Find the prime factors of:

1,884	1,710	1,161	1,020
4,129	1,121	2,500	1,001

4. Find the prime factors of:

3,465	6,552	8,192	6,660
3,003	7,826	6,561	2,448

5. Find the prime factors of:

4,158	6,006	3,125	8,225
3,150	5,324	2,475	9,936

6. Find the prime factors of;

3,675	3,825	1,935	9,576
2,310	5,324	1,800	5,075

7. At $6.25 a ton, how much coal will pay for 37½ tons of hay at $12.50 a ton?

8. A man lost $1,275 on a farm, which he sold for $12,525. How much would he have received for it if he had sold it at a profit of $2,750?

9. How many square inches of paper will it take to cover the sides and top of a box 14 in. long, 9 in. wide, and 8 in. high?

10. How many cubic inches are there in a rectangular block of marble 4 ft. long and 6 in. square at the ends?

11. If the divisor is $59, the quotient $284, and the remainder $28, what is the dividend?

12. The sum of two numbers is 138,457, and one of them is 48,589. What is the other number?

13. Bought land at $12 an acre, paying $5,160 for it, and sold it at $16 an acre. How much did I gain?

1. John was sent to the store with 60 cents to buy 3 lb. of beef @ 11¢, 6 lb. rhubarb @ 2¢, 2 bunches of radishes @ 5¢. How many cents should he bring back?

2. Reckon change from $1 for 3 bunches of asparagus @ 8¢, 2 qt. potatoes @ 10¢, lettuce, 13¢.

3. 363 children are marching in 3 equal rows. How many are there in a row?

4. If a party of 10 men catch 55 lb. of fish, how many pounds and ounces ought each man to have?

5. If $81 is paid for 9 weeks' labor, what should be paid for 4 weeks'? 7 weeks'? 12 weeks'?

6. What is $\frac{1}{2}$ of $\frac{1}{4}$? $\frac{1}{2}$ of $\frac{1}{5}$? $\frac{1}{2}$ of $\frac{1}{6}$? $\frac{1}{3}$ of $\frac{1}{2}$? $\frac{1}{3}$ of $\frac{1}{4}$?

7. What is $\frac{1}{3}$ of $\frac{1}{5}$? $\frac{1}{4}$ of $\frac{1}{5}$? $\frac{1}{5}$ of $\frac{1}{3}$? $\frac{1}{5}$ of $\frac{1}{6}$? $\frac{1}{4}$ of $\frac{1}{2}$?

8. What is $\frac{1}{3}$ of $\frac{5}{6}$? $\frac{5}{6}$ of $\frac{2}{3}$? $\frac{3}{4}$ of $\frac{2}{7}$? $\frac{1}{7}$ of $\frac{2}{3}$? $\frac{2}{3}$ of $\frac{2}{3}$?

9. The difference between $\frac{1}{2}$ and $\frac{1}{4}$ of a pile of apples is 8 quarts. How many quarts are there in the pile?

10. If $\frac{1}{3}$ of a yard of silk costs 1\frac{1}{2}$, what will 1 yd. cost?

11. A grocer sold eggs at 20¢ a dozen, which was $\frac{2}{3}$ of what they cost him. What did they cost him?

12. $6\frac{1}{4}$ is $\frac{5}{8}$ of what number?

13. $4\frac{1}{2}$ is $\frac{3}{10}$ of what number?

14. A farmer sold 6 pigs for $24, which was $\frac{2}{3}$ of what he paid for them. What did he pay for one?

15. If 9 bottles of ink cost 2\frac{1}{4}$, what will 5 bottles cost?

16. If 6 lb. of lead cost 1\frac{1}{2}$, what will 7 lb. cost?

17. What is 1% of 2,000? 3%? 5%? $6\frac{1}{4}$%?

18. 120 bu. is 60% of how many bushels?

19. $80 is 40% of how many dollars?

20. Nellie spelled correctly 97% of the words given to her class. She missed nine words. What per cent did she miss? How many words were given out?

21. Find 20% of $465. 25% of $178.
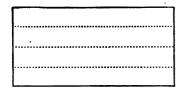
1. Bought tea at $\frac{1}{2}$ a pound; sold it at 62$\frac{1}{2}$¢ a pound. What was gained on 25 pounds?

2. I bought 312 yd. of velvet at 1.33\frac{1}{3}$ a yard. Sold it at a gain of a dollar on a yard. What did I receive for it?

3. If I paid $\frac{5}{8}$ of a dollar each for 19 knives, and sold them at 87$\frac{1}{2}$¢ each, how much did I gain or lose?

4. At 1\frac{1}{4}$ a pair, how many pairs of gloves can I buy for $125?

5. Grace had 44\frac{3}{4}$ in the bank, and earned 9\frac{2}{3}$. If she spent 33\frac{7}{10}$ for clothing, how much had she left?

6. A man owned $\frac{3}{4}$ of a paper mill; he sold $\frac{2}{3}$ of his share for $26,320. How much was the whole mill worth?

7. If your father can earn 14\frac{4}{5}$ in 7 days, how much will he earn in 24 days?

8. If 7$\frac{1}{4}$ lb. of cheese cost 90 cents, how many pounds can be bought for $1.10?

9. If you should gather 24$\frac{1}{2}$ quarts of chestnuts, and sell 8$\frac{3}{4}$ quarts, how many quarts would you have left?

10. If 250 men weave 625 yards of carpet in a certain time, how many yards will a hundred men weave?

11. If 87$\frac{1}{2}$ bu. of wheat cost $78.75, what will 12$\frac{1}{2}$ bu. cost?

12. A man bought 387 acres of land for $8,514, and divided each acre into 8 equal parts. What was the cost of each part?

13. An agent bought land at $34 an acre, and sold it for $40.50. What did he gain on 97 acres?

14. Bought 387 acres of land at $17 an acre, and sold it at $13 an acre. What was the loss?

15. If a whip factory in Westfield, employing 270 men, produces 9,000 whips in 36 days, how many men must be employed to do the same work in 12 days?

16. A grocer bought 8 chests of tea, each chest containing 48 lb., at 50¢ a pound. He sold it at 68$\frac{1}{2}$¢ a pound. Find gain.

1. A collector receives 6% on all collections. He collects $3,800. How much does he keep? How much does he pay his employer?

2. What is the area of a circle whose radius is 14 ft.?

3. What is the circumference of a circle whose diameter is 245 ft.?

4. A merchant having $135 bought 9 coats and had $18 left. What did he pay for each coat?

5. If 192 tons of coal cost $1,344, what will 51 tons cost?

6. If ⅝ of an acre of land is worth $25, what are 17½ acres worth?

7. In how many days can 90 men dig a ditch that 45 men can dig in 540 days?

8. At $3.25 a cord, find the value of a pile of wood 320 ft. long, 4 ft. wide, 8 ft. high.

9. A builder paid $78.20 for cement. If it cost him 85¢ a barrel, how many barrels did he buy?

10. How many cubic feet in a rectangular block of stone 18 ft. long, 4 ft. wide, 2 ft. thick? How many square feet in its entire surface?

11. If 6 men can do a piece of work in 24½ days, in how many days can 4 men do it?

12. The product of two numbers or factors is .0625. One of the factors is 1.25, what is the other?

13. J. D. Furber bought of C. O. Clement, Nov. 1902, 2 dictionaries @ 90¢, 9 arithmetics @ 87¢, 24 spellers @ 20¢. Dec. 2 he bought 2 reams of paper @ $2.12, 3 doz. pencils @ 50¢, 12 slates @ 17¢. Dec. 20 he paid $20.

Make out an itemized bill, Dec. 1. A statement and bill, Jan. 1, 1903. Send a statement and letter demanding immediate payment, Jan. 15.

14. If 22 baskets of peaches cost $26.84, what will 55 baskets cost?

1. A gentleman who owned ¾ of a farm sold ⅔ of his share. How much of the farm did he sell?

2. 2 in. is how many times ½ in.?

3. How many ¼ in. in 1 in.? In 3 in.?

4. What is ½ of ½ in.? ½ of ¼ in.? ¼ of ½ in.?

5. What part of an inch is 2 times ⅓ in.? 2 times ¼ in.?

6. What part of an inch is 4 times ¼ in. 4 × ½ in.? 4 × 1/16?

7. Find ⅓ of ½ in. ½ of ¼ in.

8. What is ½ of 2 in.? ¼ of 2 in.?

9. Nellie had a half holiday (6 hours) to spend. She spent ⅓ of that time with a sick friend. What part of the day did she spend with her friend? How many hours?

10. Make a problem to find the area of a square.

11. Make a problem to find the surface of a square pyramid.

12. How many sides has a pentagonal pyramid? An octagonal?

13. Make a problem to find cost of one article.

14. Make a problem to illustrate prime numbers.

15. Make a problem to find per cent of gain.

16. A farmer sold ⅔ of his sheep, and the dogs killed ¼. How many sheep had he at first, if he had 30 sheep left?

17. A, B, and C bought some land. A paid 5/12 of the amount, B 4/12, and C $33. What did the land cost?

18. George and Henry bought a quantity of paper. George paid $1.50, and Henry the rest. If Henry paid ⅔ of the whole, how much did both pay?

19. I bought some corn, and fed ⅝ of it to my horse. If I have 48 bu. left, how many bushels did I buy?

20. How many cubic feet in a wheat bin 10 ft. by 8 ft. by 7 ft.?

21. 72 is ¾ of what number? ⅝ of what number?

22. How many acres of land in a lot 20 rd. long and 16 rd. wide?

1. This diagram represents a room 24 ft. long and 12 ft. wide. Suppose the carpet is 1 yd. wide, how many breadths will it take to cover the room? How long will each breadth be? How long will all the breadths be?

2. How do you find the number of breadths needed in a room when the breadths run lengthwise? When they run widthwise?

NOTE. — Be careful that the width of the carpet and the width of the room are of the same denomination.

3. If a room is 15 ft. wide and 20 ft. long, and the carpet 3 ft. wide, how many breadths of carpet will it take when they run lengthwise? How many yards will it take?

In the following examples let the breadths run lengthwise, the usual way, and find the number of yards of carpeting required for:

4. A room 12 ft. by 18 ft.   Carpet 1 yd. wide.
5. A room 15 ft. by 17 ft.   Carpet 1 yd. wide.
6. A room 15 ft. by 18 ft.   Carpet 1 yd. wide.
7. A room 12 ft. by 15 ft.   Carpet ⅔ yd. wide.
8. A room 18 ft. by 21 ft.   Carpet ⅔ yd. wide.
9. A room 20 ft. by 30 ft.   Carpet ¾ yd. wide.

NOTE. — In buying carpets breadths are not split; it is necessary to buy a full breadth and turn a part under.

10. A room 21 ft. by 7 ft.   Carpet 1 yd. wide.
11. A room 11 ft. by 16 ft.   Carpet 1 yd. wide.
12. A room 16 ft. 6 in. by 20 ft. 4 in.   Carpet 1 yd. wide.
13. A room 15 ft. 4 in. by 18 ft. 6 in.   Carpet ¾ yd. wide.

NOTE. — In this lesson no allowance is made for waste in matching patterns. For that point see next lesson.

This figure represents a room 15 ft. long and 12 ft. wide. In order to match the figure in the carpet it is necessary to make each breadth 8 in. longer than the room. This is called a waste, because it obliges the purchaser to buy more carpet than he needs for the room. Add the waste to each breadth.

Using the following data find the cost:

	Room.	Width of Carpet.	Breadths Run.	Loss in Matching.	Cost a Yard.
1.	15 ft. by 14 ft.	1 yd.	Lengthwise.	8 in.	$1.00.
2.	14 ft. by 12 ft.	1 yd.	Lengthwise.	6 in.	$ .90.
3.	18 ft. by 15 ft.	¾ yd.	Crosswise.	5 in.	$ .85.
4.	12 ft. by 11 ft.	⅜ yd.	Lengthwise.	9 in.	$1.10.
5.	14 ft. by 13 ft. 6 in.	1 yd.	Crosswise.	None.	$1.20.
6.	13 ft. by 10 ft.	¾ yd.	Crosswise.	10 in.	$1.12½.
7.	18 ft. by 16 ft.	1 yd.	Lengthwise.	None.	$ .75.
8.	18½ ft. by 15 ft.	⅜ yd.	Lengthwise.	9 in.	$ .80.
9.	14½ ft. by 12½ ft.	1 yd.	Crosswise.	10 in.	$ .90.
10.	11 ft. by 10 ft.	1 yd.	Lengthwise.	8 in.	$1.40.
11.	40 ft. by 30 ft.	1 yd.	Crosswise.	None.	$1.50.
12.	17 ft. by 14½ ft.	¾ yd.	Crosswise.	6 in.	$1.15.
13.	15 ft. by 13 ft. 6 in.	⅜ yd.	Lengthwise.	12 in.	$ .65.
14.	14 ft. 6 in. by 12 ft.	1 yd.	Lengthwise.	9 in.	$ .90.
15.	12 ft. 3 in. by 10 ft. 9 in.	⅜ yd.	Crosswise.	10 in.	$ .72.
16.	17 ft. by 15 ft. 6 in.	1 yd.	Lengthwise.	4 in.	$1.00.
17.	12 ft. 9 in. by 10 ft. 6 in.	1 yd.	Lengthwise.	None.	$1.05.
18.	24 ft. by 16 ft. 8 in.	¾ yd.	Crosswise.	5 in.	$1.08.
19.	16 ft. 4 in. by 14 ft. 6 in.	1 yd.	Lengthwise.	6 in.	$1.19.
20.	16 ft. 9 in. by 14 ft. 8 in.	¾ yd.	Lengthwise.	10 in.	$ .87½.
21.	17 ft. 8 in. by 16 ft.	⅜ yd.	Lengthwise.	None.	$1.50.
22.	21 ft. by 16 ft.	1 yd.	Crosswise.	8 in.	$ .63.
23.	15 ft. by 15 ft.	⅜ yd.		10 in.	$1.10.
24.	14 ft. by 14 ft.	1 yd.		9 in.	$1.20.

1. By what must both numerator and denominator of $\frac{2}{3}$ be multiplied to change it to 6ths? 12ths? 15ths?

2. Make and perform an example to illustrate Addition of Fractions.

3. Make and perform an example illustrating how to find selling price, when cost and loss per cent are given.

4. Make and perform an example illustrating how to find the sum of three given numbers.

5. Make and perform an example illustrating how to find the area of a rectangle.

6. Divide $\frac{4}{7}$ by 4; $\frac{10}{11}$ by 5; $\frac{8}{16}$ by 3; $\frac{3}{8}$ by 2; $\frac{4}{7}$ by 3.

7. Divide $\frac{3}{8}$ by 3; $\frac{1}{4}$ by 2; $\frac{4}{7}$ by 2; $\frac{10}{18}$ by 5; $\frac{2}{12}$ by 3.

8. Divide $\frac{1}{3}$ by $\frac{1}{4}$; $\frac{1}{4}$ by $\frac{1}{2}$; $\frac{3}{8}$ by $\frac{1}{4}$; $\frac{3}{7}$ by $\frac{1}{2}$.

9. Divide $\frac{1}{3}$ by $\frac{3}{7}$; $1\frac{1}{2}$ by $\frac{1}{3}$; $3\frac{1}{3}$ by $\frac{1}{4}$; $4\frac{1}{3}$ by $\frac{1}{4}$; $\frac{1}{4}$ by $4\frac{1}{3}$.

10. Reduce to mixed numbers:

$$\tfrac{18}{4}, \ \tfrac{41}{8}, \ \tfrac{17}{3}, \ \tfrac{19}{7}, \ \tfrac{11}{9}, \ \tfrac{47}{8}, \ \tfrac{82}{9}, \ \tfrac{17}{15}, \ \tfrac{63}{7}, \ \tfrac{74}{8}.$$

11. $\frac{2}{3}$ of 60 is $\frac{2}{5}$ of what number?

12. If one man can build a wall in $8\frac{1}{4}$ days, how long will it take 11 men to build it?

13. At $6 a barrel, what will $6\frac{2}{3}$ bbl. of flour cost?

14. A man sold a cow for $35, which was $\frac{5}{8}$ of what she cost. What did she cost?

15. If $\frac{1}{4}$ of a ton of hay cost $5, what will 8 tons cost?

16. If 2 tons of hay cost $40, what will $\frac{2}{3}$ of a ton cost?

17. If I own $\frac{5}{8}$ of a farm, and sell $\frac{1}{3}$ of my share, how much have I left?

18. What part of 6 is 1? 3 is what part of 6? 5 is what part of 6?

19. What part of $\frac{5}{8}$ is $\frac{2}{3}$?

20. If $\frac{3}{14}$ of a pole is standing in mud, $\frac{3}{7}$ in water, and 15 ft. above water, how long is the pole?

21. How many oranges at 4¢ each must be given for 12 lemons at 8¢ each?

1. The product of three numbers is 4,375; two of the numbers are 7 and 25.   What is the third number?

2. The sum of four numbers is 4,987.   Three of the numbers are 820, 1,529, 1,719.   What is the fourth number?

3. How many square feet of lumber are needed to board the gable ends of a barn, each end being 24 ft. wide, and having an altitude of 8 ft.?

4. How many square feet in the surface of a spire in the form of an hexagonal pyramid whose slant height is 100 ft., and each side of the base 4 ft.?

5. Find the surface of a square pyramid whose slant height is 60 in., and one side of whose base is 24 in.

6. What is the entire surface of a block of stone in the form of a rectangular solid, 9 ft. by 4 ft. by 3 ft.?   How many cubic feet in the stone?

7. What is the circumference of a circle whose diameter is 14 ft.?   21 rods?

8. What is the diameter of a circle whose circumference is 22 ft.?   44 yards?

Find the area of the following triangles:

9. Base 48 ft., altitude 20 ft.

10. Base 12½ ft., altitude 6¼ ft.

11. If 30 bu. of wheat cost \$27.00, what is the cost of 45 bu. at the same price?

12. A farmer bought 29 head of cattle for \$928, and sold them at an average gain of \$5 a head.   How much did he get for them?

13. By selling a carriage for \$178, I lost \$27.   What did it cost me?

14. I sold 640 acres of land at \$18 an acre.   I kept 5% as my commission.   What was my commission?

15. If 28 men can grade a road in 72 days, how long will it take 36 men to do ½ of the work?

1. Divide $3\frac{2}{3}$ by $1\frac{3}{8}$; $17\frac{7}{11}$ by $5\frac{5}{8}$; $9\frac{3}{8}$ by $4\frac{1}{2}$; $6\frac{3}{8}$ by $8\frac{5}{8}$; $10\frac{7}{8}$ by $8\frac{1}{4}$; $5\frac{1}{2}$ by $8\frac{1}{4}$.

2. Divide:

a.	$\frac{4}{11}$ by $\frac{3}{7}$	b. $\frac{4}{7}$ by $\frac{5}{8}$	c. $\frac{5}{8}$ by $\frac{2}{3}$	d. $\frac{5}{8}$ by $\frac{11}{12}$
	$1\frac{5}{8}$ by $\frac{7}{10}$	$\frac{5}{8}$ by $2\frac{1}{4}$	$2\frac{1}{2}$ by $\frac{5}{6}$	$\frac{5}{8}$ by $\frac{7}{13}$

3. If $2\frac{1}{2}$ bu. of oats will keep a horse 1 week, how long will $18\frac{3}{8}$ bu. keep him?

4. How many acres are there in 280 square rods?

5. One man has a field 80 rd. square; another has one 160 rd. long, by 40 rd. wide. How many acres has each?

6. At $3 a rod, how much will it cost to fence each field?

7. How many square yards of plastering are there in a room 24 ft. long, 18 ft. wide, and 10 ft. high, if the doors and windows take out 174 square feet?

8. A man bought a piece of land 1,200 ft. long and 420 ft. wide at $25\rlap{/}c$ a square foot. How much did it cost him?

9. If $10\frac{1}{2}$ lb. of sugar cost $42\rlap{/}c$, what will $24\frac{3}{4}$ lb. cost?

10. What will it cost to carpet a room 24 ft. by 15 ft. with carpeting $\frac{3}{4}$ of a yard wide, at $1.25 a yard, if the breadths run lengthwise?

11. A room is 35 ft. long and 17 ft. wide. How many yards of carpeting 27 in. wide will it take when the breadths run lengthwise? When they run across the room?

12. If a piece of land contains 10 A., and is 80 rd. long, how wide is it?

13. If a ton of coal occupies 40 cu. ft., what will it cost to fill a bin 12 ft. long, 6 ft. wide, and 5 ft. deep, with the coal at $6.50 a ton?

14. Find the prime factors of 348, 450, 704, 945, 344, 590, 711.

15. Divide .08 by 1.600. 56.28 by .0056.

16. If one side of a square field is 5 rd. 6 ft. long, how many square feet are there in the field?

1. One pint is what per cent of a quart?
2. One quart is what per cent of a gallon?
3. One ounce is what per cent of a pound?
4. One gill is what per cent of a pint?
5. One gill is what per cent of a quart?
6. One gill is what per cent of a gallon?
7. One pint is what per cent of a peck?
8. One inch is what per cent of a foot?
9. One foot is what per cent of a yard?
10. One and one-half feet are what per cent of a yard?
11. One peck is what per cent of a bushel?
12. One dozen is what per cent of a gross?
13. One quire of paper is what per cent of a ream?
14. One pencil is what per cent of a dozen pencils?
15. One year is what per cent of a score of years?
16. One day is what per cent of a week?
17. One month is what per cent of a year?
18. A nickel is what per cent of a dime?
19. One nickel is what per cent of a quarter?
20. One day is what per cent of the school days in a week?
21. One month is what per cent of a year?
22. Substitute two for one in each of the questions in this lesson, and solve.
23. One-third of an apple is one-third per cent of my apples. How many apples have I?
24. One-fifth of an apple is one per cent of all my apples. How many apples have I?
25. An agent collected a debt of $200, and kept 5% for doing the work. How much money did he keep? What did he call the money kept in this way?
26. When ½ of the cost of an article is gained, what per cent is gained?

Find the selling price in the following:

	Cost.	Gain.	Cost.	Gain.
1.	$ 8	$37\frac{1}{2}$%	$ 8	$62\frac{1}{2}$%
2.	48	$8\frac{1}{3}$%	48	$87\frac{1}{2}$%
3.	392	25 %	392	45 %
4.	128	$62\frac{1}{2}$%	128	$37\frac{1}{2}$%
5.	75	$33\frac{1}{3}$%	75	80 %
6.	135	60 %	135	$66\frac{2}{3}$%
7.	150	20 %	150	$33\frac{1}{3}$%
8.	120	50 %	120	$66\frac{2}{3}$%
9.	240	$87\frac{1}{2}$%	240	60 %
10.	960	$33\frac{1}{3}$%	960	80 %
11.	960	$83\frac{1}{3}$%	548	$87\frac{1}{2}$%
12.	548	78 %	420	$16\frac{2}{3}$%
13.	660	85 %	150	20 %
14.	770	62 %	260	22 %
15.	880	75 %	370	30 %
16.	990	84 %	480	50 %
17.	1100	32 %	590	60 %
18.	1240	36 %	610	40 %
19.	1250	38 %	720	$66\frac{2}{3}$%
20.	1260	42 %	830	34 %
21.	1270	50 %	940	42 %
22.	1280	65 %	1150	55 %
23.	1350	$33\frac{1}{3}$%	1160	64 %
24.	1440	25 %	1170	$33\frac{1}{3}$%
25.	1560	75 %	1220	75 %
26.	1680	82 %	2170	80 %
27.	1450	30 %	2260	90 %
28.	1760	40 %	2310	$87\frac{1}{2}$%
29.	1820	45 %	2240	$62\frac{1}{2}$%
30.	1930	63 %	2170	46 %
31.	1475	40 %	2340	66 %

1. A man died whose property was worth $15,000. This was divided between his two sons. If the elder received $2,500 more than the younger, how much did each receive?

2. How many bushels of apples at ⅓ of a dollar a bushel may be bought for ⅔ of a dollar?

3. Divide 9⅞ by 3⅘, and 4⅔ by 9¼.

4. Find the prime factors of 30, 48, and 56.

5. A schoolroom 28 ft. by 30 ft. by 12 ft. seats 72 children. How many cubic feet of air are there for each child?

6. What is the value of 4 piles of wood 150 ft. long, 4 ft. wide, and 8 ft. high, at $5.50 a cord?

7. How many square yards are there in the surface of a rectangular block that is 9 ft. long, 4½ ft. wide, and 5 ft. high?

8. At $9 a cord, what is the cost of a load of wood 16 ft. long, 4 ft. wide, and 6 ft. 4 in. high?

9. How many square feet are there in a floor 15 ft. 8 in. wide, and 18 ft. 6 in. long?

10. Divide .144 by .004.   2.8 by .007.

11. Multiply .9642 by .009.   11.124 by .0002.

12. What will 1½ miles of telegraph wire cost at $.025 a foot?

13. At $.14½ a quart, what will 2 bushels of grass seed cost?

14. If a man can build 15⅔ rd. of wall in 5⅞ days, how much can he build in 2¼ days?   5¼ days?

15. If cloth is 16½¢ a yard, how many quarts of berries at 11¢ a quart will pay for 2⅔ yards?

16. Four men, A, B, C, and D, bought a mill. A paid for ¼ of it; B for ⅔; C for ⅕, and D the rest, $990. What did the mill cost?

17. At $1⅔ a box, how many boxes of raisins can be bought for $9⅔?

18. How many posts and how many rails will be required for a fence 156 ft. long, if the posts are set 12 ft. apart, and the fence is 5 rails high?

1. Henry gives $1.25 for one ball, 50¢ each for two others. If he pays $3 for 4 balls, what is the price of the fourth ball?

2. What will 16 hats cost at $2¼ each?

3. A barrel of sugar contains 300 pounds. What is it worth at 5¢ a pound?

4. A farmer exchanged 7 sheep worth $12 each for cows worth $42 each. How many cows did he get?

5. If a man and his two sons earned $90, and the man earned $40, how much did each boy earn, if each earned the same amount?

6. If my house rent is $360 a year, how much rent do I pay from Jan. 1 to July 1?

7. Three-fourths of a gallon of molasses cost 36 cents, what is the price of a gallon?

8. When butter is worth 16 cents a half pound, how much must I pay for 11 ounces?

9. How many pints are there in ⅞ of a gallon?

10. When eggs are worth 25¢ a dozen, how many eggs can be bought for $3?

11. Give answers:

42 ÷ 3	14 × 6	41 − 25	67 + 17
91 ÷ 7	31 × 7	90 − 19	14 + 36
56 ÷ 4	90 × 8	67 − 48	6 + 16
90 ÷ 6	14 × 3	80 − 15	13 + 29

12. Give answers:

60 × 1½	⅔ of 50	800 ÷ 400	½ − ⅛
60 × 1⅓	⅞ of 80	900 ÷ 300	⅓ − ¼
60 × 1⅛	⅔ of 90	800 ÷ 200	⅓ − ⅛

13. Give answers:

1,200 ÷ 600	2,800 ÷ 100	35 × 100	234 × 100
1,400 ÷ 700	3,600 ÷ 100	74 × 100	678 × 100
4,000 ÷ 800	4,500 ÷ 100	43 × 100	345 × 100

1. Mr. D. C. Moore, on May 2, 1902, bought of Austin & Co., 14 lb. tea @ 65¢ ; 25 lb. starch @ $.05½ ; 55 lb. of soap @ $.06½ ; 70 lb. coffee @ $.22 ; 160 lb. "A" sugar @ $.04⅝ ; 65 lb. rice @ $.06¼.

On June 3, he bought 40 lb. crackers @ $.06¾ ; 1 doz. bottles mustard @ $.25 ; 2 doz. olive oil @ 60¢ ; 25 lb. cheese @ 9½¢ ; 7 bbl. flour @ $5.25 ; 28 lb. of raisins @ $.24 ; 15 lb. currants @ 11½¢ ; 7 doz. gelatine @ 15¢. On June 10 he paid $75.00. July 2, he paid in full.

Render an itemized bill June 1. A receipted bill July 2.

2. A schoolroom, 36 ft. long by 30 ft. wide and 18 ft. high, contains how many cubic feet of air?

3. At 22¢ a yard, how much will it cost to plaster the above room, if 100 yards are deducted for doors and windows?

4. If in a boarding house they use 20¼ lb. butter in 7½ days, how many pounds do they use in a day?

5. What is the cost of 486¾ bu. corn at 62½¢ a bushel?

6. If ₇⁄₁₁ of a ton of hay costs $12¾, what will 5¾ tons cost?

7. From one hundred million, two hundred forty-seven thousand take one million four hundred nine.

8. A pole stands ¼ in the ground, ⅓ in the water, and 15 ft. above the water. What is the length of the pole?

9. How many pounds of maple sugar, at 17½¢ a pound, will pay for 24⅔ lb. of coffee at 27¾¢ a pound?

10. A pole is ¼ in the mud, ⅔ in the water, and 14 ft. above the water. What is its length?

11. What are the contents of a floor 18¼ ft. long and 16¾ ft. wide?

12. Multiply forty-eight hundreths by sixty-four thousandths.

13. What is the cost of 18¾ cords of wood at $5⅝ a cord?

14. Perform the fifteenth example, using decimals.

15. What is the cost of 15.375 cords of wood at $8.25 per cord?

1. How many tenths in 4½ and 2⅔?

2. A grocer had 80 bbl. of flour, and sold ⅜ of it. What is the rest worth at $5.25 a barrel?

3. A fruit dealer had 7.5 doz. cocoanuts, and bought 8¼ doz. more. He sold ⅔ of them for $9.45. How much was that for one?

4. If you buy apples at the rate of ⅔ of a peck for 30 cents, and sell them at $.58 a peck, how much do you gain on a peck? On 5 bu. 3 pk.?

5. If .5 of a gallon of sirup cost 30 cents, what will 7⅔ gallons cost?

6. A drover bought a car-load of cattle containing 32 head for $800, and sold them all for $1,120. What was the average gain on each?

7. If 4 oz. of tea cost 15 cents, how much can be bought for $21.60?

8. If I pay $2.70 for books, $1.65 for a hat, $13.50 for a suit of clothes, and $4.70 for a pair of shoes, how much shall I have left from a check of $27.85?

9. A farmer sold 210 bushels of wheat at $.96 a bushel, and bought hay at $14.40 per ton. How many tons did he buy? If he should sell the hay at $16.25, what would he gain?

10. Hon. John Jenks bought of Horace Parsons 7 lb. coffee @ 38¢; 12 lb. sugar @ 6¢; 6 lb. corn starch @ 11¢; 5 lb. tea @ 87¢. Make out a bill and receipt it.

11. At $1.75 a rod, what will be the cost of 1 mile of fence?

12. A man bought 140 acres of land for $7,560, and sold 86 acres of it at $75 an acre, and the remainder at cost. How much did he make?

13. A floor is 14 ft. by 15 ft. The carpet is ¾ yd. wide. Will it take a greater or a less number of yards if the breadths run lengthwise or widthwise? At $2.25 a yard what will be saved?

1. When 15 bu. of wheat will pay for 5 cd. of wood at $4 a cord, how much is the wheat a bushel?

2. If 7 plows can be bought for $77, how many can be bought for $44?

3. How many cents are there in 6 half-dimes? In 4 quarter-dollars?

4. To build a wall 800 bricks will be required. If I have 500 now, how many must I buy?

5. I have one piece of rope 10 ft. long, and another 2 yd. long. How long are both pieces?

6. A grocer buys butter at 20¢ a pound, and sells it for 25¢. What is his gain per cent? How much will he gain on 3 lb.?

7. 12 yd. are how many feet? 12 ft. are how many yards?

8. ⅔ of 12 are —— ?   12 is ⅔ of —— ?

9. ¾ of 12 are —— ?   12 is ¾ of —— ?

10. ⅖ of 10 are —— ?   10 is ⅖ of —— ?

11. ⅗ of 20 are —— ?   18 is ⅗ of —— ?

12. ⁴⁄₇ of 14 are —— ?   14 is ⁴⁄₇ of —— ?

13. ⅝ of 24 are —— ?   24 is ⅝ of —— ?

14. 3 ft. 4 in. equals —— in?   5 yd. 2 ft. equals —— ft.?

15. Henry lives ½ mile from school. How many miles does he travel in a week in going to and from school, if he goes home to dinner?

16. Nellie's slate cost 15 cents, which was ⅝ as much as her arithmetic cost. How much did the slate and arithmetic cost?

17. Mr. Smith had 4 acres of land. He sold 5 lots, each lot containing ⅖ of an acre. How many acres had he then?

18. ⁴⁄₇ of 84 are —— ?   12 is ⁴⁄₇ of —— ?

19. ⅗ of 90 are —— ?   12 is ⅗ of —— ?

20. How much will 6 lb. of butter cost at 12½¢ a pound?

21. A house was insured for $4,000 at 1%. What was the cost of insuring?

1. Add: 4 bu.   **2.** Add: 3 pk.   **3.** Add: 7 qt.

5 bu.	1 pk.	4 qt.
1 bu.	2 pk.	5 qt.
6 bu.	1 pk.	2 qt.
16 bu.	7 pk.	18 qt.

4. Add: 4 bu. 3 pk. 7 qt.

5 bu.	1 pk.	4 qt.
1 bu.	2 pk.	5 qt.
6 bu.	1 pk.	2 qt.
16 bu.	7 pk.	18 qt.
18 bu.	1 pk.	2 qt.

In the first three examples, we have three columns of concrete numbers to add. In the fourth example we have the same three columns arranged as parts of one compound number. Add as at first, and the result is 16 bu. 7 pk. 18 qt. Since 8 qt. make 1 pk., 18 qt. will make 2 pk. and 2 qt. remaining. Write the 2 qt. in the column of quarts, and unite the 2 pk. with the 7 pk., making 9 pk. Since 4 pk. make a bushel, 9 pk. will make 2 bu. and 1 pk. remaining. Write the 1 pk. in the column of pecks, and unite the 2 bu. with the 16 bu., making 18 bu.

NOTE. — Be careful in writing Compound Numbers that only those of the same denomination are in the same column.

5. Add: 18 gal. 3 qt.; 60 gal. 3 qt. 1 pt.; 61 gal. 3 qt.; 57 gal. 3 qt. 1 pt.

6. Add: 15 da. 23 hr. 55 min. 17 sec.; 13 da. 15 hr. 17 min. 38 sec.; 10 da. 23 hr. 42 min. 17 sec.; 16 da. 16 hr. 38 min. 47 sec.; 20 da. 52 min. 57 sec.

7. mi.	rd.	ft.	in.	**8.** Add bu.	pk.	qt.
21	295	11	1	85	3	7
45	279	10	11	9	2	5
35	214	9	10	98	0	6
58	276	16	10	2	3	1
54	70	16	1	15	2	4

9. Add: 21 bu. 3 pk. 7 qt. 1 pt.; 48 bu. 2 pk. 1 pt.; 28 bu. 6 qt.; 75 bu. 1 pk. 5 qt. 1 pt.

1. Add 125 gal. 3 qt. 1 pt. 2 gi. ; 75 gal. 2 qt. 1 pt. 3 gi. ; 45 gal. 3 qt. 2 gi. ; 39 gal. 1 qt. 1 pt. ; 250 gal. 2 qt. 1 pt.

2. How much wood is there in three piles, of which the first contains 12 cd. 4 cd. ft. 7 cu. ft., the second 9 cd. 12 cu. ft., and the third 20 cd. 6 cd. ft. 5 cu. ft. ?

3. Add 57 A. 25 rd. 15 yd. ; 129 A. 18 rd. ; 37 A. 50 rd. 13 yd. ; 75 A. 12 yd.; 35 rd. 10 yd.

4. Add 13 mi. 159 rd. 1 yd. 7 in. ; 7 mi. 302 rd. 2 ft. 8 in. ; 15 mi. 263 rd. 1 yd. 1 ft. 6 in. ; 23 mi. 308 rd. 1 ft. 9 in.; 30 mi. 227 rd. 2 ft. 4 in.

5. If I buy an acre of land for $80, and sell it for $90, what is the gain per cent?

6. What will it cost to paint an octagonal church spire whose slant height is 80 ft., and the sides of whose base are each 8 ft., at $5\frac{1}{2}$ cents a square foot?

7. What is 27% of $6,723 ?

8. If $\frac{4}{5}$ of a store is worth $5,200, how much is $\frac{7}{8}$ of it worth ?

9. Three piles of wood contain, respectively, 16 cd. 3 cu. ft. ; 19 cd. 3 cu. ft.; 27 cd. 18 cu. ft. How much wood in the three piles ?

10. Change 187,620 min. to weeks.

11. Change 10 square rods, $3\frac{1}{2}$ square feet, to square inches.

12. A farmer bought 3,350 lb. of plaster at $5.20 a ton. How much did it cost?

13. Divide: .3075 by .75.   18.1771 by 6.7.

14. Multiply: 25.75 by 5.6.   24.40 by .0008.

15. Reduce to decimals: $\frac{7}{40}$, $\frac{3}{16}$, $\frac{7}{8}$.

16. A roll of carpet containing 80 yd. cost $64.   If $48\frac{3}{4}$ yd. were sold at cost, what was received ?

17. Reduce $63\frac{4}{5}$ to an improper fraction.

18. If a man earn $53\frac{3}{4}$ a week, how much can he earn in 52 weeks?

1. Add: 2⅓ and 3¼   6½ and 5¼   4¼ and 2½
          1⅔ and 3½   3¼ and 2⅔   8¾ and 3⅔
          2¼ and 3½   8¼ and 6¼   6¼ and 2⅔

2. If a man walks 3¼ miles the first hour, and 3½ miles the second, how far does he walk in two hours?

3. What is the value of:

   ½ — ¼   ¾ — ⅓   ⅓ — ⅛   ⅔ — ½
   ¾ — ⅔   ⅞ — ¼   ½ — ⅛   ⅔ — ⅜
   ⅝ — ¾   ¼ — ⅛   ⅚ — 3/7   ⅝ — ⅔
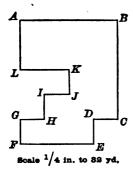
4. I bought a sheep for $3¼, and sold it for $4¾.

5. Arthur is 6¾ years old, and Bessie is 8¼ years old. What is the sum of their ages? How much older is Bessie than Arthur?

6. Mr. Morse is 40 years old, and his daughter Eva is ½ of ¾ as old. How old is Eva?

7. A man sold ⅓ of his sheep to one man, ¼ to another, and had 6 remaining. How many had he at first?

8. Mr. Wood makes a profit of 21 cents on every bag of meal that he sells. What will be his profit on 4 bags?

9. Mr. R. gets 25 cents an hour for his work. How much will he get for 24 hours work? How many hours must he work to earn $15?

10. If a pound of sugar cost 9 cents, how many pounds can you buy for $2.34. For $9.36?

11. Samuel gets 9¢ an hour for weeding. How many hours will it take him to earn $1.35?

12. What is ⅔ of 6? ¾ of 8? ⅗ of 15?

13. What is 4/7 of 14? ⅝ of 32? ⅔ of 18?

14. Change to improper fractions: 3½, 1¾, 2¼, 4⅞, 3⅔.

15. Change to mixed numbers: 9/2, 4/3, 7/4, 8/5, 13/8, 7/2.

16. If you divide an inch into halves, and then divide each of these halves into 4 equal parts, what portion of an inch will each part be?

1. Multiply 864 by 16⅔.
2. Divide 14,400 by 16⅔.
3. Reduce to simplest form 1⅝ + ⅝.
4. Divide ⅝ by 7/12.
5. Divide 125 by 3⅘.
6. Multiply 1⅔ by 9/10.   4⅔ by 1½.
7. Multiply 91 by 1½.   90 by 9/10.
8. Multiply 8⅝ by 24.   63⅘ by 56.
9. From 55½ take 38⅜.   From 54¼ take 21⅞.
10. Add 12⅔, 28⅝, and 15⅔.
11. Multiply .0596 by .0008.   2.007 by .4096.
12. Divide 6.144 by .004.   .128 by .0256.
13. If ⅝ of a field is worth $325, what is the whole field worth?
14. If ⅔ of a farm is worth $4,900, what is ¾ of it worth?
15. A man who owned ¾ of a ship sold ⅝ of his share for $21,000.   What was the value of the whole ship?
16. Divide .0027 by .45.
17. 47 11/14 − 32⅔.   28 3/31 − 13⅛.
18. 8⅘ × 7⅓.   5⅝ × 8⅞.   4⅝ × 6¼.
19. 6¼ ÷ 5½.   37½ ÷ 16⅔.   7½ ÷ 3¼.
20. Simplify : $\dfrac{1\frac12}{\frac12}$. $\dfrac{3\frac45}{1\frac{1}{10}}$. $\dfrac{8\frac12}{7\frac23}$.

21. A man's house rent is 480 a year.   This is ⅝ of his salary.   If he saves ⅓ of his salary every year, how long will it take him to save $2,304?
22. A man owing .68 of an acre of land, sold .25 of what he owned.   What part of an acre did he sell, and what part did he have left?
23. A man lost $12,000.   If he had 1⅛ of his money left, how much had he at first?
24. At $1⅔ a basket, how many baskets of peaches can be bought for $352?
25. At $3⅘ a yard, how much will 58¾ yd. of velvet cost?

1. A farmer raised 3,000 bu. of oats, and sold 8½% of them. How many bushels had he left?

2. In one high school there are 240 pupils. 15% of this number are seniors, 25% are juniors, 30% are sophomores. How many belong to the freshman class?

3. A grocer had 3 hogsheads of molasses. The first contained 125 gal., the second 107 gal., the third 100 gal. He lost 10% by leakage, and sold 65%. What was the value of the remainder at 15¢ a quart?

4. If you bought 36 gal. of maple sirup for $16.20, and sold it at 54¢ a gallon, what was the per cent of profit?

5. A father left his son $6,000. He invested 25% of it in railroad stocks, 50% of it in business, and put the remainder in a bank. How much did he put in the bank?

6. Paid $4,230.75 for a shipment of flour. I gained in selling it 24%. Find the selling price.

7. A man owned 348 acres of land. He sold ⅝ of it at $45 an acre. How much money did he receive after paying 2% commission for selling?

8. Find 16% of 200. 13% of 400.

9. Find 27% of 395. 38% of 750.

10. A man who had 500 bu. of wheat sold 40 bushels. What per cent of his wheat did he sell?

11. Two men own 4,320 tons of coal. One man owns 62½% of it. How many tons do each own?

12. A father left his son all his property. The son invested 75% of it in business, and had $6,045 left. How much money did his father leave him?

13. A man invests $2240, and makes a profit of 18¼%. How many dollars does he gain?

14. 45 acres is 15% of a man's farm. How many acres are in his farm?

15. $80 is what per cent of $640?
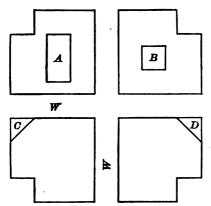
1. If it costs $4 to carry a load 20 miles, how far can it be carried for $12?

2. A farmer agreed to give a laborer $6 for every 3 days' work. How much did he receive a week?

3. How much will be the wages for 1 year, if 4 months' wages amount to $48?

4. How much will 18 lb. of sugar cost, if 6 lb. cost 36¢?

5. If 4 oranges are worth 12 cents, how many oranges must be given for 6 pineapples, worth 12 cents each?

6. Six-ninths of 18 are how many times 6?

7. Two-thirds of 24 and three-fourths of 16 are how many times 7?

8. $\frac{2}{3}$ of 21 and $\frac{5}{8}$ of 40 are how many times 6?

9. 10 is $\frac{1}{2}$ of 20 times what number?

10. 20 is $\frac{1}{4}$ of 16 times what number?

11. $\frac{2}{3}$ of 12 is $\frac{2}{7}$ of what number?

12. $\frac{3}{4}$ of 12 is $\frac{5}{8}$ of what number?

13. $\frac{4}{7}$ of 21 is $\frac{3}{10}$ of what number?

14. $\frac{5}{8}$ of 36 is $\frac{1}{3}$ of what number?

15. $\frac{3}{4}$ of 8 is $\frac{2}{3}$ of what number?

16. At $12\frac{1}{2}$¢ a dozen, what will 4 dozen eggs cost?

17. At 6\frac{1}{3}$ what will 10 bbl. of flour cost?

18. How many are 9 times $10\frac{3}{4}$?

19. What will $9\frac{2}{3}$ bbl. vinegar cost at $4 a barrel?

20. If 1 gold pin costs $2\frac{2}{3}$, how much will 6 cost at the same rate?

21. What will $8\frac{2}{3}$ yd. of cord cost at 6¢ a yard?

22. If 2 qt. of beans cost 16 cents, what will 1 gill cost?

23. If 1 man can dig a ditch in 15 days, how long will it take 5 men?

24. An agent charged $12 for collecting a bill of $240. What per cent did he charge?

Scale $^1/_4$ in. to 32 yd.

1. How many boards, each 12 ft. long, will it take to build a fence 6 boards high round this field?

2. How many posts will be needed for the fence if placed 6 ft. apart?

3. How many yards of wire will it take to put three strands of wire round the field? How many rods?

4. How far is it from *A* to *D* by way of *B*?

5. How far is it from *A* to *D* by way of *L*?

6. How far is it from *B* to *J* by way of *A*?

7. How far is it from *B* to *J* by way of *C*?

How far is it from:

8. *A* to *B*? *A* to *E*? *A* to *H*? *A* to *K*?
A to *C*? *A* to *F*? *A* to *I*? *A* to *L*?
A to *D*? *A* to *G*? *A* to *J*? *A* to *A*?

9. How far is it from *L* to *G*? How far would it be if you went in a straight line?

10. How far is it from *D* to *H*? How far in a straight line?

11. How many pickets 4 in. wide, and placed 2 in. apart, will it take to build a fence round the lot?

12. To find the area of this field, into how many rectangles would you divide it?

13. Find the square yards in the field.

14. Find the square feet in the field.

15. What is the lot worth at 22¢ a square foot?

16. What point is the same distance from *B* when measured in both directions on the lines?

17. If ¼ of an inch represents 40 rods, answer questions 4, 5, 6, 7, and 8.

18. If you can walk a mile in 15 min., how long will it take you to walk round the lot?

This diagram represents a park. Scale ¼ in. to 10 ft. *A*, *B*, *C*, and *D* are flower-beds. *W*, *W*, are walks.

1. Find the area of the flower-beds, and the area of the two walks. Find the area of the lawn, which is all the rest of the figure.

2. At 12¢ a square foot, find the cost of covering the walks with gravel.

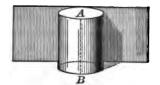3. Find the number of cubic yards of gravel that it will take to raise the walks six inches.

4. If you receive 10¢ an hour for weeding the flower-beds, and can weed 10 sq. ft. in 15 min., how much will you receive for weeding each flower-bed? For weeding all the beds?

5. If you receive 40¢ an hour for cutting the grass on the lawn, and can cut 2,000 sq. ft. in 30 min., how much will you receive for cutting the grass?

6. How many geranium plants set one foot apart, and one foot from the sides of the bed, will cover *A*?

7. How many pansy plants set 6 in. apart will it take to make a border for *B*?

8. The area of the walks is what per cent of the area of the whole park?

9. The area of the flower-beds is what per cent of the area of the walks?

10. The area of *B* is what per cent of the area of *A*? Of all the flower-beds?

11. The area of *C* is what per cent of the area of *A*? Of *B*?

12. If the jogs at the four corners were added to the park, what per cent would the area of the park be increased?

1. If I buy goods for $8, and sell them for $12, what pei cent do I make?

2. If I buy for $12, and sell for $16, what per cent do I make?

3. If I buy for $20, and sell for $24, find my gain per cent.

4. If I buy for $24, and sell for $27, find my gain per cent.

5. Find my gain per cent, if I buy for $36, and sell for $39.

6. If I buy for $16, and sell for $20, what is my gain per cent?

7. If I buy goods for $5, what must be my selling-price to gain 20%?

8. If I buy goods for $6, and sell so as to gain 33⅓%, what is my selling-price?

9. What must be my selling-price in order to gain 25% on goods for which I paid $8?

10. If I make 8⅓% on goods, for which I paid $12, what is my selling-price?

11. What must be my selling-price if I gain 66⅔% on goods that cost me $9?

12. For what must I sell goods that cost me $14 so as to gain 50%?

13. How many cubic feet in a box 3 ft. long, 2½ ft. wide, and 2 ft. deep?

14. How many feet are there in ½ a rod?

15. If a stovepipe measures 22 in. in circumference, what is its diameter?

16. A box is 12 in. long, 12 in. wide, and 12 in. high. How many cubic feet does it contain?

17. How many inches in:

2 ft. 4 in. ?	3 ft. 10 in. ?	1 yd. 4 in. ?
3 ft. 7 in. ?	4 ft. 8 in. ?	2 ft. 6 in. ?

18. Find the quotient of 1.6 divided by .8.

1. Add 18 cd. 113 cu. ft. 452 cu. in.; 25 cd. 97 cu. ft. 537 cu. in.; 73 cd. 137 cu. ft. 876 cu. in.; 12 cd. 113 cu. ft. 108 cu. in.; 63 cd. 47 cu. ft. 360 cu. in.

2. How many rails 12 ft. long will inclose a lot 50 rd. long and 28 rd. wide, the fence being 4 rails high?

3. Change 14 cd. 47 cu. ft. to cubic feet.

4. Change 5 T. 98 lb. 11 oz. to ounces.

5. Brown & Smith of Chicago sold to Mrs. Mary Kennedy, Dec. 28, 1902, the following: 121 yd. muslin @ 18½¢; 56 yd. cotton cloth @ 11½¢; 6¼ doz. handkerchiefs @ $2.25; 9 pairs gloves @ $1.25; 5¼ doz. collars @ $3.50 a dozen. Make out her bill.

6. A coal-dealer received $18.00 for 5,760 lb. of coal. What was the price of a ton?

7. If your father burns 65,750 cu. ft. of gas in his store every year, what will his gas-bill be at $1.75 a thousand feet?

8. What will 9 bales of cotton cost, each bale containing 350 lb., at 16⅜¢ a pound?

9. Divide 3,462,706,614 by 567,843.

10. A man sold 60 bu. of oats at $.42; 40 bbl. of flour at $6.50; 56 bu. corn at $.58. Make out the bill, deducting 3% for cash.

11. A has $975 more than B. If both have $7,647, how much has each?

12. A farmer has ⅔ of his sheep in one field, ⅓ of them in another, and the remainder, 16, in a third. How many sheep has he in all?

13. A floor containing 15 square yards is 9 ft. wide. How long is it?

14. If you take 120 steps a minute, and each step is 24 inches long, how many miles can you walk in an hour? How long will it take you to walk from Holyoke to Springfield, a distance of 9 miles?

1. The wheel of my carriage is 42 in. in diameter. How far have I traveled when the wheel has made 1,430 revolutions?

2. How many eggs at 12½¢ a dozen must be given in exchange for 16¼ yd. of silk at $1.25 a yard?

3. A lot of land is 5 rd. long and 42½ ft. wide, and has round it a tight board fence 4 ft. high. Find the entire cost of the fence, if the boards cost $16 per M., painting 15¢ a square yard, and building 8¢ a square foot.

4. From a piece of cloth measuring 53½ yards, there were sold 45⅔ yd. What is the remnant worth at $2½ a yard?

5. How many paving stones 9 in. square will it take to pave a street 5 rd. long, and 30 ft. wide?

6. A field is 37 rd. long and 26 rd. wide. At 3¢ a yard, what will it cost to fence the field with 4 strands of barbed wire?

7. A man owns ⅔ of a mill, and sells ¼ of his share for $8,400. What is the whole mill worth?

8. I handed the grocer $5.00 to pay for 5 lb. of tea @ 62½¢, and 5½ lb. of crackers @ 9¢. Find my change.

9. Find change from $3.00 after buying 6 lb. starch @ 12½¢, and 3 lb. coffee @ 33½¢.

10. Oct. 18, 1902, Mr. J. Ross bought of Smith & White 28 bbl. flour @ $5.37½; 416 bu. corn @ 53¢; 215 bu. oats @ 40¢. Send his bill and a letter asking for immediate payment Nov. 15. Send him a receipt for $150 received Nov. 18. Send a statement Dec. 1.

11. If a gallon contains 231 cubic inches, how many gallons will a tank hold that is 18 ft. long, 15 ft. wide, and 6 ft. deep?

12. The perimeter of a rectangular lot is 260 ft. If the lot is 30 ft. wide, how long is it? What is its area?

13. Add fifteen thousandths; thirty-one hundredths; one hundred and twenty-nine thousandths; eighty-one ten-thousandths; three hundred, twenty-seven, and seven tenths.

1. William bought 36 apples for 25 cents, and sold them at the rate of 4 for 3¢. Did he gain or lose? and how much?

2. A farmer's wife received $4 for cheese. If she sold it at 16⅔¢ a pound, how many pounds did she sell?

3. How many pounds of coffee at 33⅓¢ a pound can I buy for $15?

4. By selling an article for $21, I lost 12½%. What did it cost? If I had gained 12½%, what should I have sold it for?

5. A man bought a cow for $20. For what must he sell her to gain 5%?

6. A man bought a yoke of oxen for $100. In selling he gained 6%. For what did he sell them?

7. A man bought a horse for $80, and in selling it lost 5%. How much did he lose? How much did he receive?

8. What are ⁴⁄₇ of 49? 63? 77? 28?

9. What are ⅝ of 32? 48? 64? 96?

10. ⅞ of 90 are how many?

11. ₁₀⁹ of 80 are how many?

12. Jacob sold a horse that cost him $240 at a loss of 25%. How much did he lose? How much did he receive?

13. Jacob sold a horse that cost him $240, and lost ¼ of its cost. How much did he lose? How much did he receive?

14. Two baskets contain 37 apples. In one there are 17 more than in the other. How many in each?

15. ⅞ of 48 is how many times 8?

16. Divide 25 oranges between Nellie and Mary, so that Nellie may have 5 more than Mary.

17. A can do a piece of work in 8 days, and B in 10 days. What part can A do in a day? What part can B do in a day? What part can both do in a day?

18. Alice has 7 pins more than Grace. Both have 29. How many has each?

Nᴏᴛᴇ. — Have each pupil make a paper cylinder. Cut on line *AB*, and open it.

All cylinders referred to in this book are right cylinders.

1. After cutting your cylinder what form have you ?

2. How do you find the surface of your rectangle?

3. The length and height of your rectangle were what dimensions of your cylinder?

4. Learn : To find the convex surface of a cylinder, multiply the circumference by the height.

5. The ends of a cylinder have what form?

6. To find the entire surface of a cylinder, what must be added to the convex surface ?
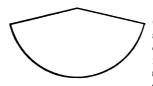
Find the convex surface of cylinders having the following dimensions :

7. Circumference 20 in., height 10 in.

8. Circumference 15 ft., height 15 ft.

9. Diameter 14 ft., height 20 ft.

10. Diameter 7 ft., height 15 ft.

11. Diameter 21 ft., height 22 ft.

12. Circumference 17 ft., height 19 ft.

13. Circumference 22 in., height 45 ft.

14. Circumference 18 in., height 21 ft.

15. Circumference 11 in., height 5 yd.

Find the entire surface of the following cylinders :

16. Circumference 44 ft., height 20 ft.

17. Circumference 22 ft., height 42 ft.

18. Circumference 66 ft., height 30 ft.

19. Diameter 14 in., height 2 ft.

20. Diameter 21 in., height 3 yd.

21. Circumference 88 ft., height 40 ft.

22. Diameter 28 ft., height 22 ft.

1. What form have you?
2. The altitude of the triangle was what line in the cone?
3. The base of the triangle was what line in the cone?

NOTE. — If the pupils find difficulty in seeing that the surface of a cone is equal to one triangle, let them cut their cone into several triangles, and arrange them as in finding the area of circles.

4. Can you give a rule for finding the convex surface of a cone? Learn: Multiply the circumference by one half of the slant height.

Find the convex surfaces of cones having the following dimensions:

5. Circumference of base 10 ft.   Slant height 20 ft.
6. Circumference of base 30 ft.   Slant height 40 ft.
7. Circumference of base 16 ft.   Slant height 32 ft.
8. Circumference of base 17 ft.   Slant height 31 ft.
9. Diameter of base   7 ft.   Slant height 16 ft.
10. Diameter of base 14 ft.   Slant height 12 ft.
11. Diameter of base 7 ft.   Slant height 24 ft.
12. Diameter of base 14 ft.   Slant height 40 ft.
13. Diameter of base 21 ft.   Slant height 27 ft.
14. Circumference of base 98 ft.   Slant height 107 ft.
15. Circumference of base 75 ft.   Slant height 113 ft.
16. Circumference of base 21 ft.   Slant height 53 ft.
17. Circumference of base 19 ft.   Slant height 43 ft.
18. Circumference of base 36 ft.   Slant height 42 ft.
19. Diameter of base 14 ft.   Slant height 45 ft.
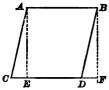20. Diameter of base 21 ft.   Slant height 84 ft.

1. A lawyer received 5% commission for collecting a debt of $900. How many dollars did he receive?

2. George had 50 marbles, and lost 10% of them. How many did he have left?

3. If a man's salary is $2,400, and he spends 16⅔% of it, how many dollars will he spend? How many will he have left?

4. A man dug 96 bu. of potatoes for his neighbor, and agreed to take 12½% of the potatoes dug as his share. How many potatoes did he receive?

5. If 2.5 acres produce 50 bu. of wheat, what is the average an acre?

6. How many times is 4.5 contained in 9?

7. If 6⅔ lb. of grapes are worth 40 cents, how much is one pound worth?

8. If 4 pairs of gloves cost $4½, what is the cost of one pair?

9. How many sixths in ⅔ of an inch?

10. How many eighths in 1⅜ of an inch?

11. Twelve times ½ inch equals what fraction?

12. Nellie had ⅞ of a yard of ribbon, and gave ¼ of a yard to her sister. How much had she left?

13. Reduce $\frac{8}{14}$ to 3ds. 1¾ to 4ths.

14. Reduce $\frac{8}{16}$ to 3ds. ⅞ to 8ths.

15. A wagon was sold for $56, which was ⅞ of its cost. What was the cost of the wagon?

16. A man and his son work in a mill. The son earns ⅔ of the sum of their wages. The father earns $20 a week. How many dollars does his son earn?

17. What part of a gross is a dozen? What part is 6 dozen?

18. Make an example illustrating how to find the dividend when the divisor and quotient are given.

19. Illustrate: Given the price of an article, to find the cost of any number of them.

1. A man bought a pile of wood for $40½. He estimated that he was paying $3.37½ a cord. If true, how many cords were there?

2. A barrel holds 2½ bu. At 34¢ a bushel, how many barrels of apples cost $13.60?

3. If your uncle owns a farm of 148 acres, valued at $67 an acre, and should exchange it for 21 cows at $36, and $8,250 in money, how much would he lose?

4. What is the price of 3 qt. of potatoes if 2 pk. 6 qt. cost $1.54?

5. A grocer paid $29.35 for a hogshead (63 gal.) of molasses, but 9 gallons leaked out. If he gained $6.29 on the hogshead, at what price a gallon did he sell it?

6. A real estate dealer bought a rectangular piece of land 160 rd. long and 120 rd. wide. He divided it into 4 equal building-lots, each lot as long as the piece of land was wide. At 1¢ a foot he fenced each lot with 4 strands of wire. Find the cost.

7. What will be the cost of 3,216 qt. of walnuts at $3.50 a bushel?

8. At 16¢ a gallon, what must I pay for 15 gal. 3 qt. 1 pt. of oil?

9. A man having $45¾, received $24₁₀⁹ for work, and then paid out $25¼. How much money had he left?

10. Find the number of pounds of butter in 4 tubs weighing 23½ lb., 24¾ lb., 31¼ lb., and 27¾ lb.

11. A. F. Pease bought of Smith & Forbes 17½ yd. muslin @ 16¢; 42 yd. cotton cloth @ 8¢; 18 yd. silk @ 87½¢; 9½ yd. flannel @ 50¢; 18 yd. Canton flannel @ 27½¢; 4 spools thread @ 5¢. Make out his bill.

12. A grocer sold 16 lb. 4 oz. cheese at 9¾¢ a pound.

13. What will 28¼ lb. rice cost, if 12½ lb. cost $1½?

14. A commission merchant sold $2,350 worth of produce at a commission of 3%. What was his commission?

1. Find the cost of plastering the walls and ceiling of a church 72 ft. long, 48 ft. wide, and 24 ft. high, at 19¢ a square yard, allowing 1,000 square feet for openings.

2. Find the prime factors of 61,200.

3. On hand at the beginning of the year, $7,145.65. Bought during the year, $3,125.78. Sold during the year, $8,176.36. On hand at the close of the year, $1,243.28. Find gain or loss.

4. Find 12½% of $848.

5. A farmer sold 32 sheep for $160, which was 33⅓% more than he paid for them. Find cost of each sheep.

6. A real estate dealer sold a house and lot for $6,650 at 2½%. What is his commission?

7. I owned a horse worth $120, and sold him for $130. Being dissatisfied, I immediately bought him back for $150. What per cent did I lose on the value of the horse?

8. Find the cost of 3,984 lb. of pork at $6.95 a hundred weight.

9. The product of two numbers is 28, and one of them is 5⅓. What is the other?

10. What is the value of a rectangular field 60 rd. long and 40 rd. wide, at $55 an acre?

11. If you buy potatoes at $1.22 a bag, and sell them at $1.57 a bag, how much will you gain on 2,378 bags?

12. Divide 3⅗ by 6½. 12⅖ by 2⅔.

13. How many dozen lead pencils, worth $1¼ a dozen, can be bought for $28½?

14. How many yards of cloth, worth $2⅘ per yard, can be bought for $38¼?

15. Make out the following bill, supplying dates and names:

  14 sacks Mocha coffee, 35 lb. each, @ 26¢.
  9 mats Java coffee,   68 lb. each, @ 27¢.
  8 mats Java coffee,   65 lb. each, @ 23¢.
  5 sacks Rio coffee, 135 lb. each, @ 17¢.

1. What will 5½ qt. of plums cost at 4¢ a pint?

2. How much is a quart of beans worth, if a bushel is worth $1.60?

3. A boy bought a peck of chestnuts for 50 cents, and sold them at 8¢ a quart. How much did he make?

4. How many feet in a rod?

5. How many square yards in a floor 15 ft. long and 12 ft. wide?

6. How many square feet in a board 20 ft. long and 1½ ft. wide?

7. How many quarts in ⅝ of a bushel?

8. How many pints in 3¾ gal.?

9. How many ounces in 2½ pounds?

10. A boy picked 3 pk. of cherries, and sold them at 5¢ a pint. How much did he receive?

11. What per cent of 125 is 25?

12. What per cent of 72 is 36?

13. What per cent of 320 is 32?

14. A man paid $80 for a horse, and sold it for 10% more than it cost. For how much did he sell it?

15. A man bought a horse for $80, and sold it for $88. What per cent did he gain?

16. For how much must butter that cost 20¢ a pound be sold to gain 10%?

17. A man sold velvet at $4 a yard, and lost 20%. What was the cost?

18. Six-ninths of 18 are how many times 6?

19. Two-thirds of 24 and three-fourths of 16 are how many times 7?

20. ⅞ of 21 and ⅝ of 40 are how many times 6?

21. 10 is ½ of 20 times what number?

22. 20 is ⅛ of 16 times what number?

23. ⅔ of 12 is ⅝ of what number?

1. How many square feet in a rhombus whose sides are 14 ft. each, and the perpendicular distance between them 10½ ft. ?

Cut from paper a rhombus, *ABCD.* Cut off the part *ACE,* and place in the position of *BDF.* What form have you now ? If the side and altitude of the rhombus remain the side and altitude of the square, how do you find the area of a rhombus ?

2. By a diagram illustrate the manner of changing a rhomboid into a rectangle. Formulate a rule for finding its area.

3. Find the area of five rhomboids, giving your own dimensions.

4. Divide twelve thousandths by three ten-thousandths.

5. If 5.75 lb. of tea cost $2.07, what will 43.675 lb. cost?

6. Make out the following bill, supplying names and date: 18,950 ft. boards @ $11 per M.; 18 M. shingles @ $5.75 per M.; 40 M. laths @ $4; 542 ft. cherry boards @ $.05 per foot; 11 M. clapboards @ $45 per M.; 4,750 ft. boards @ $18.50 per M.

7. In 11 miles, 141 rd., 9 ft., how many feet?

8. What will it cost to plaster a room 14 ft. long, 12 ft. wide, and 10 ft. high, at 30¢ a square yard?

9. How many cords of wood in a pile 72 ft. long, 4 ft. wide, and 10 ft. high?

10. How many bushels, pecks, and quarts in 6,759 quarts?

11. What will 175 lb. 8 oz. of sugar cost at 10¢ a pound?

12. Add: 5 gal. 3 qt. 1 pt. 2 gi.; 9 gal. 1 qt. 1 pt. 3 gi.; 7 gal. 3 qt. 1 pt. 2 gi.; 5 gal. 4 qt. 1 gi.

13. In one school there should be 480 pupils. If only 95% are present, how many are absent?

14. I had $640 yesterday. I have $96 to-day. What per cent of the money I had yesterday have I now?

15. A wholesale dealer lost 500 bbl. of apples, which was 40% of the number of barrels he had at first. How many has he now?

Find the entire surface of the following:

1. A rectangle, length 60 rd., width 45 rd.
2. A triangle, base 17 ft., altitude 22 ft.
3. A rhomboid, base 12 ft., altitude 15 ft.
4. A pyramid, base, a 9-foot hexagon, slant height, 23 ft. (Convex surface.)
5. A rectangular prism, base 15 ft. by 12 ft., and height 19 ft.
6. A cone, circumference 22 ft., slant height 68 ft.
7. A cone, diameter 21 ft., slant height 48 ft.
8. A pyramid, base a 20-ft. square, slant height 50 ft.
9. A cylinder, circumference 44 ft., height 60 ft.
10. A cylinder, diameter 14 ft., height 27 ft.
11. A house, 70 ft. long, 48 ft. wide, with 22 ft. posts. The height of the gable is 12 ft., and the rafters are 28½ ft.
12. An equilateral triangle, sides 6 ft. each, and a perpendicular line from one vertex to the opposite side, 5½ ft.
13. A stovepipe, diameter 7 in., and length 40 ft.
14. A rhomboid, 6 ft. long, and width 3 ft.
15. A room 36 ft. by 24 ft. by 11 ft.
16. A room 25 ft. by 18½ ft. by 9½ ft.
17. A rectangular field 26.84 rd. long, and 12.18 rd. wide.
18. Find the number of yards of carpet needed for a room 18 ft. by 12 ft. 6 in. The carpet, which is ⅞ yd. wide, should run the most economical way.
19. Find the square feet of boards needed to cover the roof and walls of a house 46 ft. long, 32 ft. wide, 40 ft. high to the ridge-pole, and 28 ft. high to the eaves, with rafters 20 ft. 6 in. long.
20. A room is 16 ft. by 12 ft. A rug covers the room, leaving a border all round 2 ft. in width. Find the area of the rug and of the border.

1. What will 3 five-cent stamps and 10 one-cent stamps cost?

2. What part of a bushel will it take to fill a four-quart measure 4 times?

3. The sum of two numbers is 76, and one of the numbers is 54. What is the other number?

4. What number must be taken from 42 to leave 28?

5. A girl practiced one hour and a quarter every day, and her sister 75 min. a day. Which one practiced the longer time?

6. 72 is how many more than 9 times 7?

7. What number must you put with each of the following numbers to make 40: 32? 26? 18? 25? 38? 20?

8. Give answers:

$33 \div 3$	$55 \div 5$	13×4	14×5
$64 \div 4$	$57 \div 3$	16×5	12×4
$48 \div 4$	$85 \div 5$	12×5	16×4

9. Give answers:

$32 - 10 - 8$	$85 - 10 - 7$	$73 - 10 - 6$
$73 - 10 - 7$	$72 - 10 - 6$	$47 - 10 - 8$
$65 - 10 - 6$	$56 - 10 - 8$	$61 - 10 - 6$
$44 - 10 - 8$	$95 - 10 - 8$	$76 - 10 - 8$

10. Give answers:

$92 - 10 - 3$	$55 - 10 - 8$	$95 - 10 - 8$
$58 - 10 - 3$	$64 - 10 - 5$	$83 - 10 - 8$
$38 - 10 - 7$	$76 - 10 - 5$	$58 - 10 - 5$
$97 - 10 - 6$	$49 - 10 - 4$	$87 - 10 - 5$
$79 - 10 - 6$	$65 - 10 - 4$	$96 - 10 - 3$

11. $\frac{1}{2}$ is what part of $\frac{2}{3}$? $\frac{1}{3}$ is what part of $\frac{4}{5}$?

12. $\frac{1}{4}$ is what part of $\frac{5}{12}$? $\frac{3}{8}$ is what part of $\frac{7}{10}$?

13. At $\$\frac{2}{3}$ a yard, how many yards of cloth can be bought for $\$\frac{22}{8}$?

14. At $\$\frac{3}{4}$ a peck, how many pecks of peaches can be bought for $\$2\frac{1}{4}$?

1. Divide .0672 by .042.
2. Divide 2 by .0002.
3. Multiply .009 by .009
4. From .9 take 9 ten-thousandths.
5. Change to decimals: $16\frac{3}{4}$, $\frac{7}{15}$, $\frac{13}{18}$, $\frac{3}{8}$.
6. Divide 810.48 by 24.56. 97.524 by .1806.
7. What is the value of .8 acres of land at $145.50 an acre?
8. If 1.25 acres of land are worth $87.50, what is the worth of 24.5 acres?
9. From six hundred dollars and thirty-six cents take two hundred eighty-four and seventy-three hundredths dollars.
10. Reduce to common fractions: .95; .525.
11. Divide 96 thousandths by 384 hundred-thousandths.
12. Reduce $\frac{44}{275}$ to a decimal fraction.
13. Add 63.43, .475, 11.674, 1.02.
14. Add 435.075, 21.07, .035, 2000.02.
15. Add four hundred and fifty-six hundredths, eight thousand four hundred and seventy-two thousandths; fifteen thousand seven hundred and twenty-one hundredths; forty-three million seven hundred thirty-three thousand eight hundred three and fifty-three thousandths.
16. If .9 of a ton of coal costs $5.67, what must I pay for 71.25 tons?
17. How many square feet in a walk 18.75 ft. long, and 2.8 ft. wide?
18. Add 4 and 7 tenths, 86 thousandths, 75 and 3 thousandths, 13 hundredths.
19. How many tons are there in 3 cars of coal, the first car containing 19.625 tons, the second car 37.125 tons, and the third car 29.375 tons?
20. What will 41.5 bu. of potatoes cost at $.875 a bushel?
21. $1.05 \times .005 \div 25 = ?$ $3.84 \times 7.5 \div .5 = ?$

1. If ⅔ of a yard of cloth cost $4⅔, what will 2½ yards cost?

2. Find the sum of 2½, 5⅔, and 8⅔.

3. What number is 3½ less than 5⅝?

4. I bought ½ of a store for $1,400. At the end of the year I sold ⅓ of my share for $600. At that rate how much had my interest increased during the year?

5. How many dozen eggs at 24¢ a dozen will pay for 48 lb. of crackers at 7½¢ a pound?

6. Add: 13⅔, 15⅔, 11⅔, 18¼.

7. If a man travel 700 miles in 8¾ days, how far will he travel in 17½ days?

8. Divide 28 by 2¼. 45 by 4¼.

9. A boy rides his bicycle 4¼ hr. in the morning, and 3⅔ hr. in the afternoon. If he rides 8⅔ miles an hour, how many miles will he ride in the day?

10. The remainder is 35,201⅝, and the subtrahend 21,056¾. What is the minuend?

11. What number divided by 14⅝ will give a quotient of 258?

12. What will 7¼ pieces of cloth cost, each piece containing 46 4 yd., if ¾ of a yard cost $1.80?

13. How many acres are there in 3 lots containing respectively 19⅔ acres, 28¼ acres, and 34 ⁷⁄₅ acres?

14. A boy rode 49⁷⁄₅ miles on his bicycle in two days. The first day he rode 31⅔ miles. How many miles did he ride the second day?

15. A merchant bought cloth at $1⅞ a yard and sold it at $2¼ a yard. What did he gain on 10 yards?

16. What will 8¾ bu. of peaches cost at $2½ a bushel?

17. If a man earns $1⅔ a day, how many days must he work to earn $73½?

18. If ¾ of a barrel of apples cost $1½, what will 8 barrels cost?

1. By selling a knife for 75 cents, a boy gained 25% on the cost.

2. A boy received a half-peck of cherries for every bushel he picked. What per cent did he receive?

3. A horse was bought for $160, and sold for $120. What was the loss per cent?

4. Max divided 5 apples equally among 5 boys. What part of an apple did each receive?

5. Find 3% of $100.

6. The width of a table is 4 ft., which is $\frac{4}{5}$ of the length. Find the length.

7. The width of a table is 4 ft., which is 80% of the length. Find the length.

8. 80 is 100% of what number?

9. A man having 400 acres of land, gave 25% of it to his son. How many acres did he give away?

10. The sum of two fractions is $\frac{3}{4}$. One of the fractions is $\frac{1}{3}$. What is the other?

11. If it takes $\frac{1}{16}$ of a yard of ribbon to make a badge, how many badges can be made from $\frac{5}{8}$ of a yard of ribbon? ·

12. Bought 10 bu. of peaches at $1 a bushel, and sold them at 30¢ a peck. How much was gained?

13. How many breadths of carpeting a yard wide will cover a floor 18 ft. wide? If the room is 21 ft. long, how many yards of carpeting will be needed?

14. I had $120. I spent $\frac{1}{3}$ of it for a watch, $\frac{1}{4}$ of it for an overcoat, and $\frac{3}{10}$ of it for board. What did I pay for each? How many dollars did I have left?

15. Rewrite example 14, using per cents instead of fractions.

16. At 10¢ a square foot, what will 3 sq. yd. of tin cost?

17. If a man can do a piece of work in 5 days, how much of it can he do in one day?

1. A rectangular lot 24 ft. long, 16 ft. wide, has a walk 8 ft. wide extending round it on the outside. Find area of the walk.

2. What is the area of a circle whose diameter is 35 ft. ? 42 ft. ? 56 ft. ?

3. What is the area of a circle whose circumference is 88 ft. ? $3\frac{1}{7}$ rd. ?

4. How many yards of plastering in the walls and ceiling of a room 16 ft. long, $12\frac{1}{2}$ ft. wide, 10 ft. high?

5. This diagram represents a cellar drawn to a scale of $\frac{1}{4}$ in. to 10 ft. How many loads must be removed in digging the cellar if it is 9 ft. deep, and a cubic yard is removed in a load?

6. Find the entire surface of a cylinder whose circumference is 22 in., and whose altitude is 2 ft.

7. A cylindrical cistern is 18 ft. deep and 7 ft. in diameter. How much will it cost to cement the sides and bottom at 20¢ a square foot?

8. My garden is 36 ft. long and 24 ft. wide. It has a walk round the outside $1\frac{1}{2}$ ft. wide. How many square feet in the walk? At 15¢ a running foot, what will it cost to inclose the garden?

(The walk is included in the garden).

9. Draw the plan of the ground floor of a house of five rooms. Let the dimensions of the kitchen be $12' \times 15'$; dining-room, $14' \times 15'$, sitting-room, $15' \times 18'$, bedroom, $12' \times 16'$, parlor, $16' \times 18'$. Find the cost of carpeting each room with material as follows: Kitchen and dining-room, linoleum, 85¢ a yard; bedroom, carpet, 75¢ a yard; sitting-room and parlor, carpet, $1.12\frac{1}{2}$. All one yard wide. Carpet to run in the most economical way. Find the cost of picture-molding for all the rooms at $9\frac{1}{2}$¢ a yard.

1. To what sum will $340 amount after being increased 5% of itself?

2. If $350 is decreased 6% of itself, what sum will be left?

3. I bought a bicycle for $60 and sold it for 5% less than it cost me. At what price did I sell it?

4. Two men engaged in business with $6400 capital each. During the first year one gained 20% and the other lost 20%. What was the capital of each man then?

5. A dozen barrels of apples cost $21. For what price must I sell each barrel to gain $33\frac{1}{3}$%?

6. Cloth which cost $1.25 was sold for 1.37\frac{1}{2}$. What was the gain per cent?

7. A man paid $48 for his harness, which is 80% of what he paid for his sleigh. What did he pay for both?

8. I bought a span of horses for $500, and in selling them I lost 6%. For what did I sell?

9. Suppose I had sold the span for 8% above cost, for what should I have sold them?

10. By selling a horse for $185, I lost $35. For how much should I have sold it to gain 8%?

11. A city of 36,000 inhabitants increases in a given time to 40,000. Find the increase per cent.

12. A owns $\frac{2}{3}$ of a house, and sells 25% of his share for $270. What is the value of the house?

13. Find $7\frac{1}{2}$% of 480. $6\frac{1}{4}$% of $8.64.

14. Find $8\frac{1}{3}$% of 1,500 yards.

15. A and B commenced business, each with $6,456. A gained 25%, and B lost 25%. How much more was A then worth than B?

16. If an article that cost $7.75 is sold for $9.61, what is the gain per cent?

17. What must I pay for insuring $75,000 worth of property at 3% of its value?

1. How many dozen eggs at 30¢ a dozen will pay for 6 yd. of cloth at 15¢ a yard?

2. How many 8-oz. packages of tacks can be made from $3\frac{1}{2}$ lb.?

3. 2 inches contain $\frac{1}{4}$ in. how many times? $2 \div \frac{1}{4} = ?$

4. $1\frac{1}{4}$ in. contain $\frac{1}{4}$ in. how many times? $1\frac{1}{4} \div \frac{1}{4} = ?$

5.
$6 \div \frac{1}{4} = ?$ $3\frac{1}{2} \div \frac{1}{2} = ?$ $8\frac{1}{2} + 7\frac{1}{2} = ?$ $6\frac{1}{2} - 5\frac{1}{4} = ?$
$8 \div \frac{1}{2} = ?$ $2\frac{1}{4} \div \frac{1}{4} = ?$ $7\frac{1}{2} + 6 = ?$ $10\frac{1}{4} - 8\frac{1}{2} = ?$
$5 \div \frac{1}{4} = ?$ $4\frac{1}{4} \div \frac{1}{4} = ?$ $9\frac{3}{4} + 1\frac{3}{4} = ?$ $18\frac{1}{4} - 1\frac{1}{2} = ?$
$2 \div \frac{1}{4} = ?$ $6\frac{1}{2} \div \frac{1}{2} = ?$ $4\frac{1}{2} + 1\frac{3}{4} = ?$ $17\frac{1}{2} - 4\frac{3}{4} = ?$

6. I gave a horse 4 qt. of oats 3 times a day. How many days did $4\frac{1}{2}$ pecks last?

7. If $1\frac{1}{2}$ qt. of milk costs 9 cents, what does $1\frac{1}{2}$ gal. cost?

8. A farmer had 2 bu. of onions to sell. He sold $2\frac{1}{2}$ pk. at one house, and $3\frac{3}{4}$ pk. at the next house. How many pecks had he left?

9. $\frac{1}{8}$ is contained in $\frac{1}{2}$ how many times? $\frac{1}{2} \div \frac{1}{8} = ?$

10. $\frac{2}{3}$ is contained in $\frac{3}{4}$ how many times? $\frac{3}{4} \div \frac{2}{3} = ?$

11.
$7\frac{1}{2} \div 4 = ?$ $11\frac{1}{2} \div 4 = ?$ $3\frac{1}{2} \div 2 = ?$ $7\frac{1}{2} \div 2 = ?$
$13\frac{1}{2} \div 2 = ?$ $16\frac{1}{2} \div 4 = ?$ $17\frac{1}{2} \div 4 = ?$ $18\frac{1}{4} \div 2 = ?$

12. James has 48 cents, and his sister Mary has $\frac{3}{4}$ as much. James has how many more cents than his sister?

13. At 25¢ a bushel, how many bushels of apples can I buy for $4? $6? $12?

14. If $\frac{3}{4}$ of a bushel of apples costs 60 cents, what will $1\frac{1}{2}$ bu. cost?

15. If I can buy 8 lb. of sugar for 50 cents, what must I pay for 4 lb.?

16. Which is greater, $\frac{3}{4}$ of 16, or $\frac{2}{3}$ of 32?

17. Which is greater, $\frac{3}{4}$ of 12, or $\frac{7}{8}$ of 16?

18. At $12\frac{1}{2}$¢ a yard, how many yards of cloth can be bought for $5? $2\frac{1}{2}$? $28?

1. Change 18 bu. 2 pk. 6 qt. 1 pt. to pints.

2. Change 2,548 sq. in. to higher denominations.

3. Find the sum of 10 bu. 3 pk. 6 qt. 1.8 pt.; 8 bu. 2 pk. 4 qt. 1.1 pt.; 7 bu. 3 qt. 1.4 pt.; 5 bu. 7 qt. 1.3 pt.; 17 bu. 3 pk. 7 qt. 1.5 pt.

4. If a man can row a mile in 9 min. 15 sec., how long will it take him to row 48 miles?

5. Change 1,495 lb. to ounces.

6. Change 1,120 rd. to miles.

7. Change 72 yd. 8 in. to inches.

8. A pile of wood contains 60 cd. If it is 4 ft. wide and 6 ft. high, how long is it?

9. How many cubic feet are there in a tank 15 ft. 3 in. long, 12 ft. 6 in. wide, and 8 ft. deep?

10. What is the cost of fencing a field 12 rd. square at 13¢ a foot?

11. Add:

yr.	mo.	da.	hr.	min.	sec.
2	7	15	14	28	39
9	11	18	6	49	27
26	7	19	23	19	28
11	8	17	21	47	56
16	9	8	5	50	38

12. Add: 12 bu. 2 pk. 5 qt. 1 pt.; 15 bu. 3 pk. 3 qt.; 29 bu. 2 pk. 1 pt.; 17 bu. 2 qt.

13. How many cubic feet of air in a room 19 ft. long, 16 ft. wide, and 9 ft. high?

14. Change 15 cd. to cubic feet.

15. Change 112 sq. rd. 5 sq. ft. to square feet.

16. Change 14 rd. 2 yd. 2 ft. to inches.

17. If a carriage wheel is 17 feet in circumference, how many times will it turn in going 4 mi. 96 rd. 2 yd. 2 ft.?

18. Change 97,124 lb. to tons.

1. In a public building a corridor 50 ft. wide extends to the north 250 ft., and then at right angles 250 ft. to the east. Draw a diagram of it ⅛ of an inch to 25 ft. Find its area.

2. With scale 1 inch to 12 ft., draw a diagram of a room 30 ft. long, 15 ft. wide, having on one side a bay window 6 ft. by 3 ft. If this room is 9½ ft. high, find the number of square yards in the walls and ceiling.

3. Find the cost of plastering the walls and ceiling of a church 72 ft. long, 48 ft. wide, and 24 ft. high, at 23⨍ a square yard, allowing 124 square yards for openings.

4. Find the cost of building a sidewalk 27 ft. long, 9 ft. 9 in. wide, at 65⨍ a square yard.

5. How many square feet in a sidewalk 10 ft. wide round the outside, of a lot 280 ft. by 160 ft. ? Make diagram.

6. How many less feet would there have been in the walk if it had run just inside of the lot?

7. How many boards 15 ft. long and 6 in. wide will be required for a close board fence 110 yd. long and 7½ ft. high?

8. A floor is 8 yd. long and 6½ yd. wide. If all my boards are 12 ft. long, 6 in. wide, how many boards will it take to cover the floor? How must I place the boards so as to waste no time in cutting?

9. A tight board fence, 6 ft. high, surrounds a lot 180 ft. by 90 ft. Find the cost of painting it at 37½⨍ a square yard.

10. At 45⨍ a cubic yard, what will it cost to dig a cellar 21 ft. wide, 48 ft. long, and 6 ft. deep?

11. With scale ½ in. to 4 in., make a drawing to represent the entire surface of a box 16 in. long, 8 in. wide, and 4 in. high. Find the area of the surface.

12. With scale 1 inch to 4 rods, draw a rectangle to represent a field 12 rd. by 15 rd. In the upper left hand corner cross off a piece 5 rd. × 3 rd., and in the lower right hand corner a piece 6 rd. by 3 rd. Find the area and perimeter of the part left.

1. How many apples must be cut up to give 24 boys ⅔ of an apple each?

2. If I buy stoves at $12 each, and sell them at 8⅓% profit, what shall I gain?

3. A horse was bought for $100, and sold for $95. What was the loss per cent?

4. A barrel of pork cost $12, and was sold for $11. What was the loss per cent?

5. A bought a horse for $150, and sold it for $180. What was his gain per cent?

6. B bought a horse for $100, and sold it for $109. What was his gain per cent?

7. $24 is ⅔ of twice as much as a coat cost. What was the cost of the coat?

8. 72 is ⅝ of how many times ¾ of 12?

9. 36 is ¾ of how many times ⅔ of 12?

10. 48 is ⅔ of how many times ½ of 18?

11. 56 is ⅝ of how many times ⅞ of 8?

12. If my wages in 8 weeks amount to $48, what will be my wages in 2⅔ weeks?

13. ⁴⁄₇ of 56 is ⅝ of how many times 8?

14. ⅔ of 36 is ⅔ of how many times 12?

15. 30 is ⅘ of how many times ½ of 12?

16. A man sold a cow for 1⅔ times what she cost him, and by so doing gained $12. How much did the cow cost him?

17. If your sister Jessie paid ⅔ of 12 dimes for a pair of gloves, how many cents did she pay?

18. Find the cost of your brother's watch, if $25 is ⁵⁄₆ of the cost of it.

19. A wagon was sold for $90, which was ¾ of what it cost. How much did it cost?

20. What per cent of my money is ⅔ of it?

Perform as examples in addition, then in subtraction.

1. $71\frac{3}{4}$ $\pm$ $47\frac{5}{8}$ $91\frac{5}{8}$ $\pm$ $42\frac{1}{3}$ $65\frac{1}{4}$ $\pm$ $46\frac{1}{3}$.

$26\frac{11}{12}$ $\pm$ $16\frac{7}{8}$ $74\frac{2}{3}$ $\pm$ $18\frac{2}{3}$ $48\frac{5}{8}$ $\pm$ $28\frac{5}{8}$.

2. A rectangular lot of land containing 5,250 sq. ft. is 125 ft. long.   How wide is it?

3. A cattle-train is made up of 19 cars, and each car contains 117 sheep.   If each sheep weighs 115 lb., what do all weigh?

4. If I buy 17 tons of iron at $37.65 a ton, and 39 tons at $43.85 a ton, what shall I gain by selling the whole at $44.83 a ton?

5. Divide 80,407,080 by 40,000.

6. If a man receives $65 a month, and spends $35 a month, in how many years will he save enough to buy a house worth $2,160?

7. I paid $55 each for 2 harnesses, and $145 for a carriage, and for a span of horses twice as much as for the carriage and harnesses.   What was the cost of all?

8. A dealer paid $4,914 for 819 bbl. of flour, and sold it at $6.75 a barrel.   Did he gain or lose? and how much?

9. A man bought 157 cows at $57 a head, and 89 at $64 a head.   He paid $1.50 a head for transportation, and sold the lot for $15,457.50.   Find the gain.

10. What are the prime factors of 40?   84?   250?   735? 9,800?

11. Reduce to improper fractions: $13\frac{5}{8}$, $14\frac{2}{3}$, $17\frac{3}{8}$, $18\frac{5}{13}$.

12. If 12 yd. of cloth cost $75, what is the cost of 8 yd. at the same rate?

13. How much silk can be bought for $514.14, if 51 yd. cost $213.18?

14. What will 89 horses cost at the rate of 23 horses for $3,450?

15. What will it cost to dig a cellar 45 ft. long, 32 ft. wide, and 6 ft. deep, at $0.27 a cubic yard?

1. With scale 1 inch to 4 feet, make a diagram for a room 18 ft. by 12 ft., having a projection on one end 10 ft. by 4 ft. Find the cost of carpet at 87½¢ a yard, breadths 1 yd. wide, and running lengthwise.

2. At 6½¢ a foot, find the cost of molding for this room.

3. At 18¢ a square yard, find the cost of plastering, if the room is 9½ ft. high.

4. I owned ⅔ of a farm, and sold ¾ of my share for $1,350. Find the value of the whole farm.

5. A man exchanged cloth at 17¾¢ a yard for 74¼ bu. potatoes at 64¢ a bushel. How many yards did he receive?

6. Multiply 26⅜ by 9½. 32⅜ by 8¼.

7. From a hogshead of molasses containing 47 gal. 3 qt. there were sold 29 gal. 1 pt. What was the remainder worth at 12½¢ a quart?

8. Bought a carriage for $160, and paid 10% of the cost for painting, and then sold it 25% above the total cost. Find the selling-price.

9. Find the area of the following triangles:

       Base 16 yd., altitude 40 ft.

       Base 4 ft. 6 in., altitude 3 ft. 9 in.

       Base 18 in., altitude 2 ft. 4 in.

10. Divide 13.5 by 225 thousandths.

11. Make a bill containing both debit and credit items.

12. If ⅔ of a yard of cloth cost $1.20, what will 2⅜ yd. cost?

13. Find the cost of 19⅜ yd. of cloth at 16½¢ a yard.

14. How much will it cost me to insure goods worth $20,470 at 1½%?

15. How much a year does a clerk earn, if he earns $76⅜ a month?

16. What will 2½ pk. of wheat cost at 1¾¢ a pound, allowing 60 pounds to the bushel?

1. Divide the following numbers by 8, giving quotients and remainders:

24	27	81	80	68	64	48	55
52	51	71	65	84	85	31	28
29	26	82	87	69	67	54	49
53	50	70	66	86	83	25	30

2. With a half-dollar I can buy —— lb. of sugar at 7¢ a pound, and have —— cents left.

3. A farmer bought a horse for $100. He traded his horse for a yoke of oxen, and sold the oxen for $120. What per cent did he gain?

4. A dealer buys meat at 12¢ a pound, and retails it at 16¢. What per cent does he make? How much does he make on 12 pounds?

5. Mention a number that may be divided by 4, 6, and 9.

6. When ¼ yd. of ribbon costs 4 cents, what will 1¼ yd. cost?

7. Reckon the change for a man who buys 43 cents' worth of goods, and gives you a dollar.

8. Divide: 800 by 100   6500 by 100   760 by 10
1200 by 100   8700 by 100   640 by 10

9. What will 22 days' board cost at $7 a week?

10. How many quarter-inch spaces on a foot rule?

11. How many more eighth-inch spaces than quarter-inch on a foot rule?

12. $\frac{2}{3} + \frac{1}{3} + \frac{1}{3}.$ $\frac{1}{2} + \frac{1}{3} + \frac{1}{4}.$ $\frac{3}{4} + \frac{5}{8}.$ $\frac{3}{5} + \frac{2}{3}.$
$\frac{3}{5} + \frac{2}{3} + \frac{5}{8}.$ $\frac{3}{4} + \frac{1}{3} + \frac{1}{2}.$ $\frac{5}{8} + \frac{1}{2}.$ $\frac{3}{4} + \frac{5}{8}.$

13. A newsboy sells 10 papers daily. If he makes ½ a cent on each, what does he earn in a week selling papers?

14. A boy gave $3 for a bushel of nuts, and sold them for 5¢ a pint. How much did he gain?

15. If a quarter-note has two beats, how many will a half-note have? A dotted quarter?

1. A house is 75 ft. long, 60 ft. wide, with 22 ft. posts. The height of the gable is 12 ft., and the rafters are 33 ft. long. Find the square feet of surface in roof, walls, and floor.

2. Let 8 hours constitute a day's work. Deduct 20 cents an hour for under time, and give 50 cents an hour for over time. Find each man's wages for the week.

	MON.	TUES.	WED.	THURS.	FRI.	SAT.	WAGES.
H	8 hr.	9 hr.	7 hr.	10 hr.	6½ hr.	7 hr.	$1.50
J	6	8½	7	9	4	8	1.25
K	7	6	6½	7	8	8	1.50
L	8	8½	4½	6½	8	10	2.00

3. If 2½ bu. of wheat cost $2, what will 85 bu. cost?

4. How many 3-in. squares can be cut from a sheet of paper 9 yd. long and 4 ft. wide?

5. Multiply .000075 by .000044.

6. At $6 a hundred, how many pounds of beef can be bought for $68.40?

7. Add 35½, 74¾, 18¾.

8. The product of two numbers is 30,420, and one of them is 39. Find the other.

9. A man saves ¼ of his salary. If he spends $750 a year, what is his salary?

10. A man paid $240 for a cow and horse. If the horse cost three times as much as the cow, find the cost of each.

11. Find the cubic contents and entire surface measurement of a box 2 ft. long, 18 in. wide, and 14 in. deep.

12. The sum of three numbers is 48,245, and two of them are 12,347 and 8,748. Find the other number.

13. Make a bill for eight articles bought at a grocery store.

14. Find the value of 26,650 lb. of iron at $16.40 a ton.

15. Multiply ⅘ of ¾ by ⅔ of ⅓.

16. Add 19¾, 11⅞, 14¾.

1. Find the area and the perimeter of a rectangular field 28 rd. long and 297 ft. wide.

2. Add: 24 rd. 5 yd. 1 ft., 4 yd. 10 in., 86 rd. 3 yd. 2 ft., 5 yd. 1 ft. 8 in.

3. At $.35 a square yard, how much will it cost to plaster a room 36 ft. long, 28 ft. wide, and 12 ft. high, allowing 383 sq. ft. for doors and windows?

4. A room is 18 ft. by 15 ft. The carpet is 27 in. wide. At $1.25 a yard, what will be the difference in price in carpeting the room if the breadths run widthwise instead of lengthwise?

5. A cellar wall, measured on the outside, is 36 ft. long, 28 ft. wide. If it is 7 ft. high and 18 in. thick, how many cubic yards of masonry does it contain?

6. A and B together have 786 acres of land, and A has 174 acres more than B. How many acres has each?

7. A farmer sold $\frac{1}{2}$ of his wheat to one man, $\frac{1}{3}$ to another, and had 147 bu. left. How many bushels did he raise?

8. Find the cost of 2,950 pickets at $3.15 a C.

9. If .75 of a ton of hay is worth $15.90, how much are 12.25 tons worth at the same price?

10. A rectangular field 30 rd. wide contains 4½ acres. How long is it?

11. A can do a piece of work in 7 days, and B can do it in 8 days. In how many days can both working together do it?

12. From two take four millionths.

13. My house is insured for $4,000 at 1¼%. What is the premium?

14. An agent sold $4,460 worth of goods at 2% commission. What was his commission?

15. A merchant lost $340, which was 17% of all his money. How much money had he?

16. How many feet of lumber at $24.40 a thousand cost $675.27?

1. Find the selling-price when the cost is $12, and the gain 12½%.

2. Find the selling-price when the cost is $15, and the loss is 66⅔%.

3. Find the selling-price when the cost is $2.50, and the gain 20%.

4. If 4 men can build a fence in 12 days, how many days will 9 men require?

5. The price of my coat was $6. I still owe 16⅔% of it. How much have I paid?

6. If ⅝ of a pound of candy cost 15 cents, what will ⅔ of a pound cost?

7. Take ½ of a number from it, and 36 remains. What is the number?

8. By selling for $8 I gain $2. What per cent of the cost do I gain?

9. If 9 balls weigh 45 oz., what will 13 balls weigh?

10. $15 is ₃⁄₁₁ of what?

11. From 3¼ take 2½.

12. If your brother earns $3 a week, and he pays 15 cents a day for dinner, and 60 cents a week for car-fare, how much can he save in a week for other expenses?

13. If a house cost me $1,200, for what must I sell it to gain 25%?

14. ⅝ of 36 is ⅓ of what number?

15. ¾ of 8 is ½ of what number?

16. At 12½¢ a dozen, what will 4 dozen eggs cost?

17. At $6⅔ what will 10 bbl. of flour cost?

18. How many are 9 times 10¾?

19. What will 9¾ bbl. vinegar cost at $4 a barrel?

20. If 1 gold pin cost $2⅔, how much will 6 cost at the same rate?

21. What will 8⅔ yd. of cord cost at 6¢ a yard?

1. What is the entire surface of a square pyramid whose slant height is 8 ft., and the sides of whose base are each 5 ft.?

2. Find the entire surface of a cone whose slant height is 60 ft., and the circumference of base 44 ft.

3. What is the convex surface of a log 35 in. in diameter, and 10 ft. long?

4. Find the factors common to 25, 45, and 70.

5. Reduce to improper fractions : $16\frac{5}{8}$, $44\frac{2}{3}$, $27\frac{3}{8}$, $14\frac{5}{19}$.

6. B's property is valued at $2,500. If the rate of taxation is $1\frac{1}{2}\%$, what tax must B pay?

7. I paid $54 to insure my house, valued at $3,600. What was the rate?

8. $12¼ is what per cent of $61¼?

9. An agent sold $12,350 worth of goods for me, and charged me $1\frac{1}{2}\%$ for his services. How much did I pay him?

10. George bought a sled for $1.20, and sold it for $1.40. What was his gain per cent?

11. 150 is 60% of what number?

12. What per cent of 24 acres is 15 acres?

13. A has $1,800 more than B, and together they have $6,500. How much has each?

14. If 12 bu. of wheat cost $10.80, what will 25 bu. cost?

15. Add 12 m. 239 rd. 12 ft. 7 in.; 16 m. 258 rd. 5 ft. 7 in.; 10 m. 232 rd. 4 ft. 6 in.

16. Reduce 796,864 lb. to tons.

17. If iron is worth $33.50 a ton, what is the value of 15,640 lb.?

18. A house is 45 ft. wide, 60 ft. long, with 20 ft. posts. The height of the gable is 9 ft., and the rafters are 25 ft. long. Find the square feet in roof, walls, and three floors. At $2.25 per M., find cost of shingling, supposing that 1,000 shingles will cover 100 square feet. At 25¢ a square yard, find cost of painting outside walls.

TABLES OF WEIGHTS AND MEASURES

FOR REFERENCE.

LINEAR MEASURE.

12 inches (in.)	= 1 foot (ft.).	5½ yards, or 16½ feet	= 1 rod (rd.).
3 feet	= 1 yard (yd.).	320 rods, or 5280 feet	= 1 mile (m.).

SQUARE MEASURE.

144 square inches (sq. in.)	= 1 square foot (sq. ft.).
9 square feet	= 1 square yard (sq. yd.).
30¼ square yards, or 272¼ square feet	= 1 square rod (sq. rd.).
160 square rods	= 1 acre (a.).
640 acres	= 1 square mile (sq. m.).

SOLID OR CUBIC MEASURE.

1728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.).
27 cubic feet	= 1 cubic yard (cu. yd.).

WOOD MEASURE.

16 cubic feet	= 1 cord foot (cd. ft.).
8 cord feet, or 128 cubic feet	= 1 cord (cd.).

LIQUID MEASURE.

4 gills (gi.)	= 1 pint (pt.).
2 pints	= 1 quart (qt.).
4 quarts	= 1 gallon (gal.).
1 gal.	= 231 cubic inches.

DRY MEASURE.

2 pints (pt.)	= 1 quart (qt.).
8 quarts	= 1 peck (pk.).
4 pecks	= 1 bushel (bush.).
1 bushel	= 2150.42 cubic inches.

AVOIRDUPOIS WEIGHT.
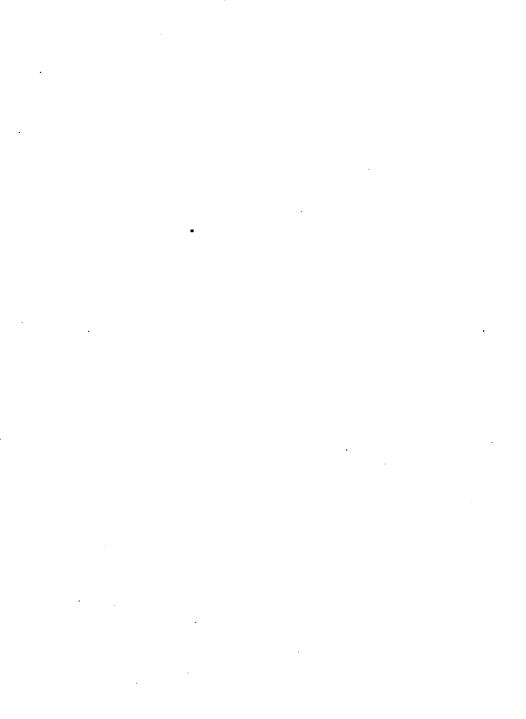
16 ounces (oz.)	= 1 pound (lb.).
2000 pounds	= 1 ton (t.).
2240 pounds	= 1 long ton

CIRCULAR MEASURE.

60 seconds (″)	= 1 minute (′).
60 minutes	= 1 degree (°).
360 degrees	= 1 circumference (circ.).

MISCELLANEOUS TABLE.

12 units	= 1 dozen.
12 dozen	= 1 gross.
12 gross	= 1 great gross.
20 units	= 1 score.
24 sheets	= 1 quire.
20 quires	= 1 ream.

TIME MEASURE.

60 seconds (sec.)	= 1 minute (m.).
60 minutes	= 1 hour (h.).
24 hours	= 1 day (d.).
7 days	= 1 week (wk.).
365 days	= 1 common year (c. yr.).
366 days	= 1 leap year (l. yr.).
100 years	= 1 century (C.).

1. If 44 cents are paid for 11 oranges, what is the c
an orange?

2. If 1 lamp is worth $5, how many lamps of the
kind are worth $45?

3. A pint of cream costs me 15 cents. If I buy a p
day, how much does my cream cost me for one week?

4. A box is 7 in. long and 5 in. wide. How long m
string be to reach round it?

5. How many quarts will fill a 2-gallon jug?

6. How many quart bottles can be filled from 24 pints of

7. In 2 years there are —— months.

8. In 11 weeks there are —— school days.

9. A tailor bought 5 yd. of cloth for $16. What was
cost of a yard?

10. Complete:

$$\frac{2)}{8} \qquad \frac{2)}{4} \qquad \frac{3)}{6} \qquad \frac{5)}{8} \qquad \frac{7)}{5}$$

11. How many hours in ⅓ of a day? In ¾ of a day?

12. I paid 56 cents for 7 lb. of raisins. What was
price a pound?

13. What is the cost of 8 lb. of oatmeal at 5¢ a pound?

14. If 1 man can do a piece of work in 35 days, in h
ny days can 5 men do the same work?

. What is the cost of a cow, if ¼ of the price is $8?

If a cow is worth $32, and a calf ¼ as much, how mu
calf worth?

How many books are worth $36, if 1 book is worth $6

f a boy earns $5 a week, in how many weeks can b
?

en and what number equals 13?

is seven less than what number?

6 a ton, what will   l cos

many 9's are t   5?

See Part I, page 93.

Multiplication is a short way of adding equal numbers.

The multiplicand is one of the equal numbers to be added.

The multiplier is the number which shows how many equal numbers are to be added.

The product is the result of the multiplication.

23	76	68	47	87	29
67	38	62	54	96	89
36	56	83	64	73	32
78	36	47	27	19	91
74	85	28	82	75	89
64	58	39	98	83	67
54	71	34	56	67	64
58	89	96	64	65	53
27	62	25	52	87	74
32	24	48	73		
42	26	63	37		
74	86	65	73		